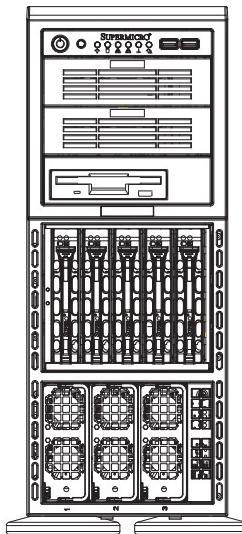


SUPER[®]

A+ SERVER 4042G-6RF/TRF



USER'S MANUAL

Revision 1.0c

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Manual Revision 1.0c
Release Date: 07 July, 2011

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Preface

About This Manual

This manual is written for professional system integrators and PC technicians. It provides information for the installation and use of the A+ SERVER 4042G-6RF/TRF. Installation and maintenance should be performed by experienced technicians only.

The A+ SERVER 4042G-6RF/TRF is a high-end server based on the SC748TS-R1400BP chassis and the H8QG6/i-F, a high-end serverboard which is based on the AMD® SR5690/SR5670/SP5100 chipset and supports four AMD Socket G34 type processors with up to 512 GB of DDR3-1333/1066 registered ECC SDRAM.

The A+ SERVER 4042G-TRF contains an H8QGi-F serverboard without SAS2 features while the A+ SERVER 4042G-6RF contains an H8QG6-F serverboard with SAS2 features.

Manual Organization

Chapter 1: Introduction

The first chapter provides a checklist of the main components included with the server system and describes the main features of the H8QG6/i-F serverboard and the SC748TS-R1400BP chassis, which comprise the A+ SERVER 4042G-6RF/TRF.

Chapter 2: Server Installation

This chapter describes the steps necessary to install the A+ SERVER 4042G-6RF/TRF into a rack and check out the server configuration prior to powering up the system. If your server was ordered without processor and memory components, this chapter will refer you to the appropriate sections of the manual for their installation.

Chapter 3: System Interface

Refer here for details on the system interface, which includes the functions and information provided by the control panel on the chassis as well as other LEDs located throughout the system.

Chapter 4: System Safety

You should thoroughly familiarize yourself with this chapter for a general overview of safety precautions that should be followed when installing and servicing the A+ SERVER 4042G-6RF/TRF.

Chapter 5: Advanced Serverboard Setup

Chapter 5 provides detailed information on the H8QG6/i-F serverboard, including the locations and functions of connections, headers and jumpers. Refer to this chapter when adding or removing processors or main memory and when reconfiguring the serverboard.

Chapter 6: Advanced Chassis Setup

Refer to Chapter 6 for detailed information on the SC748TS-R1400BP server chassis. You should follow the procedures given in this chapter when installing, removing or reconfiguring SCSI/SATA or peripheral drives and when replacing system power supply units and cooling fans.

Chapter 7: BIOS

The BIOS chapter includes an introduction to BIOS and provides detailed information on running the CMOS Setup Utility.

Appendix A: BIOS Error Beep Codes

Appendix B: BIOS POST Checkpoint Codes

Appendix C: System Specifications

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Chapter 1

Introduction

1-1 Overview

The A+ SERVER 4042G-6RF/TRF is a high-end server that is comprised of two main subsystems: the SC748TS-R1400BP 4U/tower server chassis and the H8QG6/i-F serverboard. Please refer to our web site for information on operating systems that have been certified for use with the A+ SERVER 4042G-6RF/TRF (www.supermicro.com).

In addition to the serverboard and chassis, various hardware components have been included with the A+ SERVER 4042G-6RF/TRF, as listed below:

- Three (3) 80x38 mm 4 pin PWM exhaust fans (FAN-0116L4)
- Three (3) 90x38 mm chassis fans (FAN-0115L4)
- One (1) air shroud (MCP-310-74802-0B)
- Four (4) CPU passive heatsinks (SNK-P0043P)
- One (1) 20-inch round 16-to-16 pin ribbon front control cable (CBL-0087)
- Three (3) 20-cm 4-to-4 pin middle fan power extension cables (CBL-0216L)
- Three (3) 30-cm 4-to-4 pin rear fan power extention with square header cables (CBL-0286L)
- One (1) 77-cm 9-to-9 pin internal USB cable (CBL-0263L)
- One (1) I/O shield (MCP-260-00027-0N)
- SAS Accessories
 - One (1) SAS Backplane with AMI MG9072 (CSE-SAS-M35TQ)
 - Five (5) 48-cm SATA Round cables (CBL-0206L)
 - Two (2) 40-cm 8-to-8 pin ribbon cables with tube for SGPIO (CBL-0157L)
 - One (1) 5-drive mobile rack (CSE-M35BP)
 - One (1) 5.25" drive tray w/o rail (FDD opening) (MCP-220-00059-0B)
 - Two (2) 5.25" drive trays w/o rail (horizontal pattern) (MCP-220-00010-01)
- Rackmount hardware kit (MCP-290-00059-0B)

1-2 Serverboard Features

At the heart of the A+ SERVER 4042G-6RF/TRF is one H8QG6/i-F quad processor serverboard, which is based on the AMD SR5690/SR5670/SP5100 chipset. Shown below are the main features of the serverboard.

Processors

The H8QG6/i-F supports four AMD Opteron 6100 series (Socket G34 type) processors. Please refer to our web site for a complete listing of supported processors (www.supermicro.com).

Memory

The H8QG6/i-F has thirty-two (32) single/dual/tri/quad channel DIMM slots supporting up to 512 GB of DDR3-1333/1066/800 registered ECC or 128 GB of DDR3 Unbuffered ECC/non-ECC SDRAM. See Chapter 5 Section 6 for more details on installing memory into the system.

SAS (AS-4042G-6RF Only)

An LSI 2008 SAS2 controller is integrated into the H8QG6-F to provide an eight port SAS (Serial Attached SCSI) subsystem, which is RAID 0, 1, and 10 supported. (Optional RAID 5 support is available with the RAIDKEY installed.) The SAS drives are hot-swappable units.

Note: The operating system you use must have RAID support to enable the hotswap capability and RAID function of the SAS drives.

Serial ATA

The South Bridge (SP5100) of the chipset includes a Serial ATA controller for six 3 Gb/s SATA drives. The hot-swappable SATA drives are connected to a backplane that provides power, bus termination and configuration settings. RAID 0, 1, and 10 are supported. Refer to the support area of our web site for procedures on setting up RAID on your system.

PCI Expansion Slots

The H8QG6/i-F board has two PCI Express 2.0 x16 slots and two PCI Express 2.0 x8 slots or one UIO slot.

Ethernet Ports

An Intel® network controller is integrated into each of the serverboards to support two Gigabit LAN ports (100/1000Base-T/1000BaseTX, RJ45 output).

Onboard Controllers/Ports

Onboard I/O backpanel ports on the serverboard include one COM port, a VGA port, two USB ports, a dedicated IPMI LAN port and two Gigabit LAN (NIC) ports.

Graphics Controller

The H8QG6/i-F features an integrated Matrox G200eW graphics chip, which includes 16 MB of DDR2 memory.

IPMI

IPMI (Intelligent Platform Management Interface) is a hardware-level interface specification that provides remote access, monitoring and administration for Supermicro server platforms. IPMI allows server administrators to view a server's hardware status remotely, receive an alarm automatically if a failure occurs, and power cycle a system that is non-responsive.

UIO

The H8QG6/i-F is a specially-designed serverboard that features Supermicro's UIO (Universal I/O) technology. UIO serverboards have a PCI-Express x8 signals that can support PCI-E cards or any one of several types of UIO card types to add SAS ports, additional LAN ports, InfiniBand®, etc. to the serverboard. This allows you to tailor the serverboard to your own needs.

Note: the server does not come with a UIO card installed.

Other Features

Other onboard features that promote system health include voltage monitors, auto-switching voltage regulators, chassis and CPU overheat sensors, virus protection and BIOS rescue.

1-3 Server Chassis Features

The following is a general outline of the main features of the SC748TS-R1400BP server chassis.

System Power

The SC748TS-R1400BP features a redundant (two separate power modules) 1400W high-efficiency power supply with I2C. This power redundancy feature allows you to replace a failed power supply without shutting down the system.

SAS/SATA Subsystem

The SC748TS-R1400BP chassis was designed to support five hot-swappable SAS/SATA hard drives.

Front Control Panel

The control panel on the A+ SERVER 4042G-6RF/TRF provides you with system monitoring and control. LEDs indicate system power, HDD activity, network activity, system overheat and power supply failure. A main power button and a system reset button are also included. In addition, two USB ports have been incorporated into the front of the chassis for convenient access.

I/O Backplane

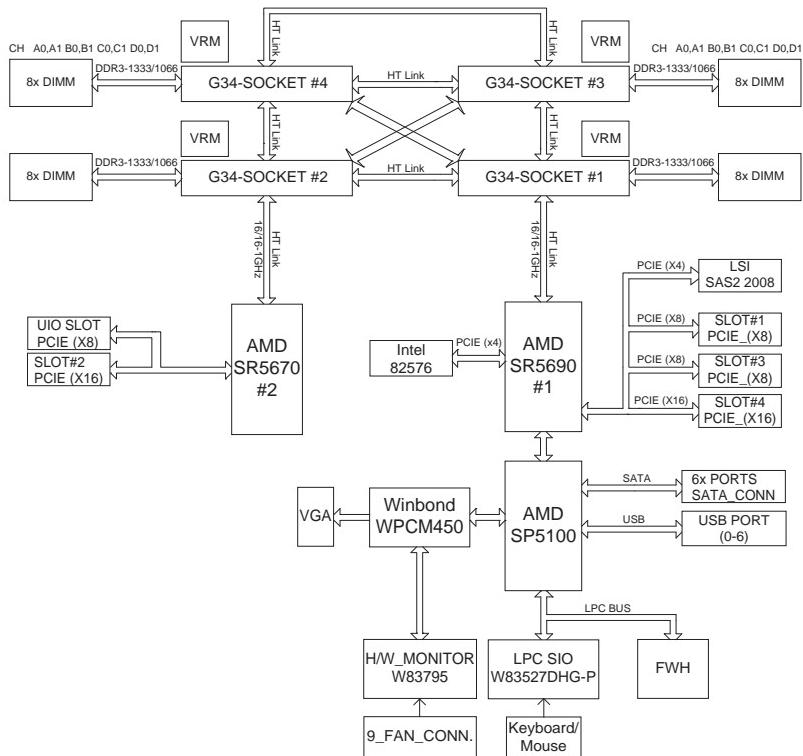
The SC748TS-R1400BP is a tower chassis that can also be used in a 4U rackmount configuration. The I/O backplane includes one COM port, a VGA port, two USB 2.0 ports, PS/2 mouse and keyboard ports, two gigabit Ethernet ports and one dedicated Ethernet port for IPMI. Two x16, one x8 and one UIO or x8 PCI-E expansion cards may be added to the system.

Cooling System

Three 8-cm hot-swap system cooling fans located in the middle section of the chassis and three 8-cm hot-swap exhaust fans are used to cool the system. An air shroud channels the airflow from the system fans to efficiently cool the processors and DIMMs. Each power supply module also include a cooling fan.

**Figure 1-1. AMD SR5690/SP5100 Chipset:
System Block Diagram**

Note: This is a general block diagram. Please see Chapter 5 for details.



1-4 Contacting Supermicro

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Technical Support:
Email: support@supermicro.com.tw
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Chapter 2

Server Installation

2-1 Overview

This chapter provides a quick setup checklist to get your 4042G-6RF/TRF up and running. Following these steps in the order given should enable you to have the system operational within a minimum amount of time. This quick setup assumes that your system has come to you with the processors and memory preinstalled. If your system is not already fully integrated with a serverboard, processors, system memory etc., please turn to the chapter or section noted in each step for details on installing specific components. The 4042G-6RF/TRF may be employed either as a tower or mounted in a rack as a 4U rackmount chassis. If using it as a tower unit, please read the Server Precautions in the next section and then skip ahead to Section 2-5.

2-2 Unpacking the System

You should inspect the box the system was shipped in and note if it was damaged in any way. If the server itself shows damage you should file a damage claim with the carrier who delivered it.

Decide on a suitable location for the 4042G-6RF/TRF. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated. You will also need it placed near a grounded power outlet. Be sure to read the Rack and Server Precautions in the next section.

2-3 Preparing for Setup

The box the system was shipped in may include two sets of rail assemblies, two rail mounting brackets and mounting screws needed for installing the system into a rack (optional kit). Follow the steps in the order given to complete the installation process in a minimum amount of time. Please read this section in its entirety before you begin the installation procedure outlined in the sections that follow.

Choosing a Setup Location

- Leave enough clearance in front of the system to enable you to open the front door completely (~25 inches).

- Leave approximately 30 inches of clearance in the back of the system to allow for sufficient airflow and ease in servicing.
- This product is for installation only in a Restricted Access Location (dedicated equipment rooms, service closets and the like).



Warnings and Precautions!



Rack Precautions

- Ensure that the leveling jacks on the bottom of the rack are fully extended to the floor with the full weight of the rack resting on them.
- In single rack installation, stabilizers should be attached to the rack.
- In multiple rack installations, the racks should be coupled together.
- Always make sure the rack is stable before extending a component from the rack.
- You should extend only one component at a time - extending two or more simultaneously may cause the rack to become unstable.

Server Precautions

- Review the electrical and general safety precautions in Chapter 4.
- Determine the placement of each component in the rack *before* you install the rails.
- Install the heaviest server components on the bottom of the rack first, and then work up.
- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges, voltage spikes and to keep your system operating in case of a power failure.
- Allow the hot plug drives and power supply units to cool before touching them.
- Always keep the rack's front door and all server panels and covers closed when not servicing to maintain proper cooling.

Rack Mounting Considerations

Ambient Operating Temperature

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the ambient temperature of the room. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (T_{mra}).

Reduced Airflow

Equipment should be mounted into a rack so that the amount of airflow required for safe operation is not compromised.

Mechanical Loading

Equipment should be mounted into a rack so that a hazardous condition does not arise due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the power supply circuitry and the effect that any possible overloading of circuits might have on overcurrent protection and power supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Ground

A reliable ground must be maintained at all times. To ensure this, the rack itself should be grounded. Particular attention should be given to power supply connections other than the direct connections to the branch circuit (i.e. the use of power strips, etc.).

2-4 Installing the System into a Rack

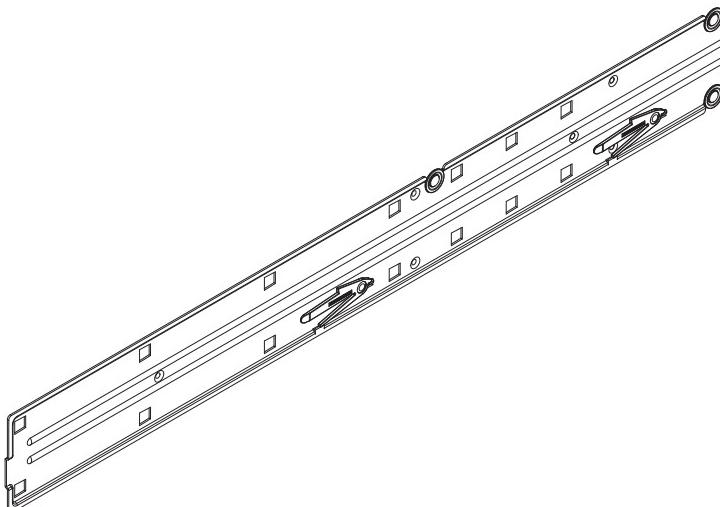
This section provides information on installing the system into a rack unit. Rack installation requires the use of the optional rackmount kit. If the system has already been mounted into a rack or if you are using it as a tower, you can skip ahead to Sections 2-5 and 2-6. There are a variety of rack units on the market, which may mean the assembly procedure will differ slightly. The following is a guideline for installing the server into a rack with the rack rails provided in the rackmount kit. You should also refer to the installation instructions that came with the rack unit you are using.

Identifying the Sections of the Rack Rails

The optional rackmount kit (MCP-290-00059-0B) includes two rack rail assemblies. Each of these assemblies consist of two sections: an inner fixed chassis rail (Figure 2-1) that secures to the chassis, and an outer rack rail that secures directly to the rack itself. The inner and outer rails must be detached from each other before installing.

To remove the inner chassis rail, pull it out as far as possible – you should hear a "click" sound as a locking tab emerges from inside the rail assembly and locks the inner rail. Depress the locking tab to pull the inner rail completely out. Do this for both assemblies (one for each side).

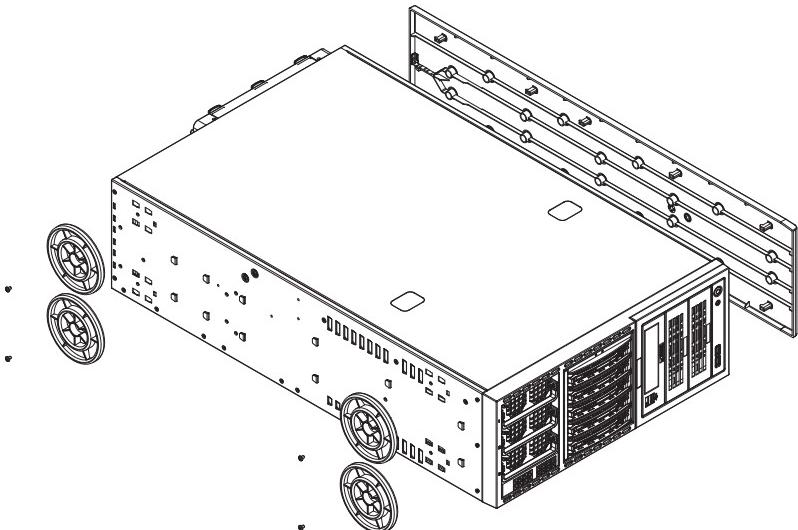
Figure 2-1. Inner Fixed Chassis Rail



Installing the Chassis Rails

You will need to remove the top bezel cover and the feet to add rack rails to the chassis. First, remove the top and right covers (top and left covers when standing as a tower chassis) by depressing the latch on the rear lip of the top (side if tower) cover to release it – then push the cover off. Finally, unscrew the four feet and remove them from the chassis (see Figure 2-2).

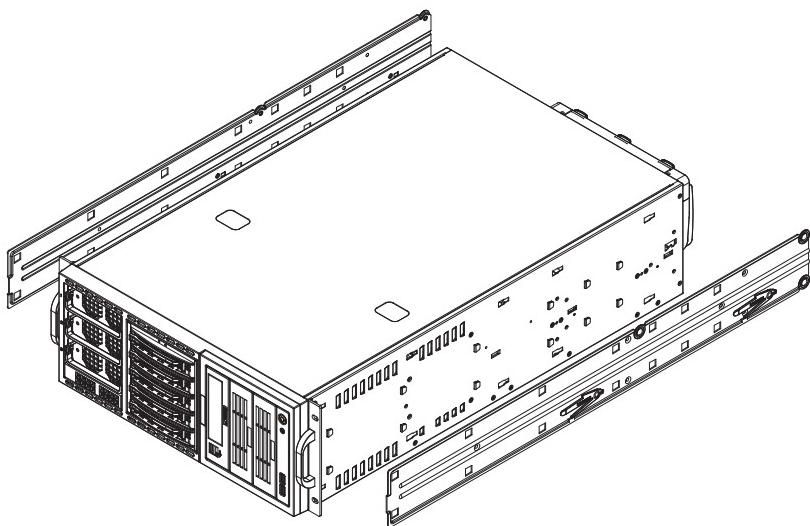
Figure 2-2. Preparing to Install the Chassis Rails



You can now attach rack rails to the top and bottom (now the sides) of the chassis. First add the rack handles. Then position the inner chassis rail sections you just removed along the side of the chassis making sure the screw holes line up. Note that these two rails are left/right specific. Screw the rail securely to the side of the chassis (see Figure 2-3). Repeat this procedure for the other rail on the other side of the chassis. You will also need to attach the rail brackets when installing into a telco rack.

Locking Tabs: The chassis rails have locking tabs that serve to lock the server into place when installed and pushed fully into the rack, which is its normal position.

Figure 2-3. Installing the Rails to the Chassis



Installing the Rack Rails

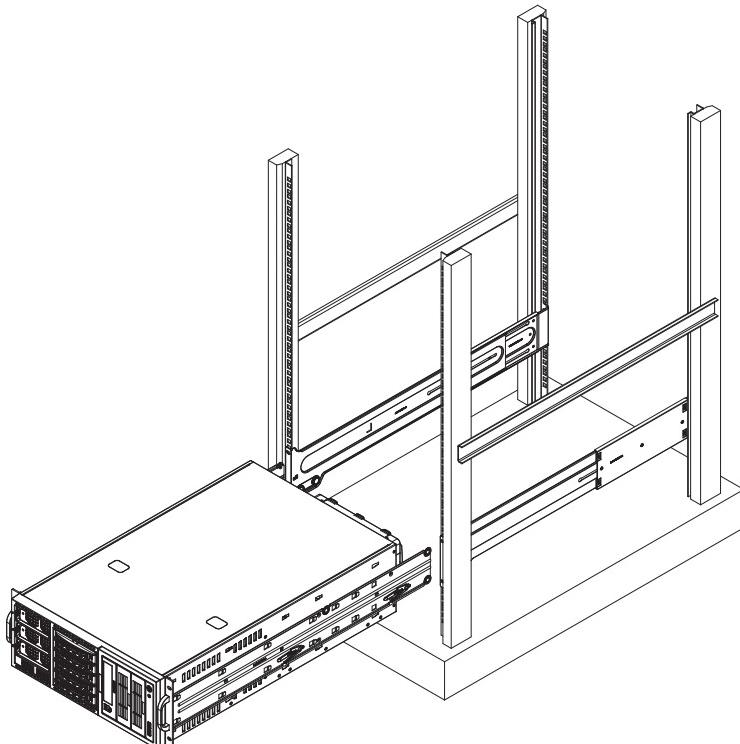
Determine where you want to place the 4042G-6RF/TRF in the rack. ([See Rack and Server Precautions in Section 2-3.](#)) Position the fixed rack rail/sliding rail guide assemblies at the desired location in the rack, keeping the sliding rail guide facing the inside of the rack. Screw the assembly securely to the rack using the brackets provided. Attach the other assembly to the other side of the rack, making sure both are at the exact same height and with the rail guides facing inward.

Installing the Server into the Rack

You should now have rails attached to both the chassis and the rack unit. The next step is to install the server into the rack. You should have two brackets in the rack mount kit. Install these first keeping in mind that they are left/right specific (marked with "L" and "R"). Then, line up the rear of the chassis rails with the front of the rack rails. Slide the chassis rails into the rack rails, keeping the pressure even on both sides (you may have to depress the locking tabs when inserting).

When the server has been pushed completely into the rack, you should hear the locking tabs "click". Finish by inserting and tightening the thumbscrews that hold the front of the server to the rack (see Figure 2-4).

Figure 2-4. Installing the Server into a Rack



2-5 Checking the Serverboard Setup

After setting up the system, you will need to open the unit to make sure the serverboard is properly installed and all the connections have been made (see Figure 2-5).

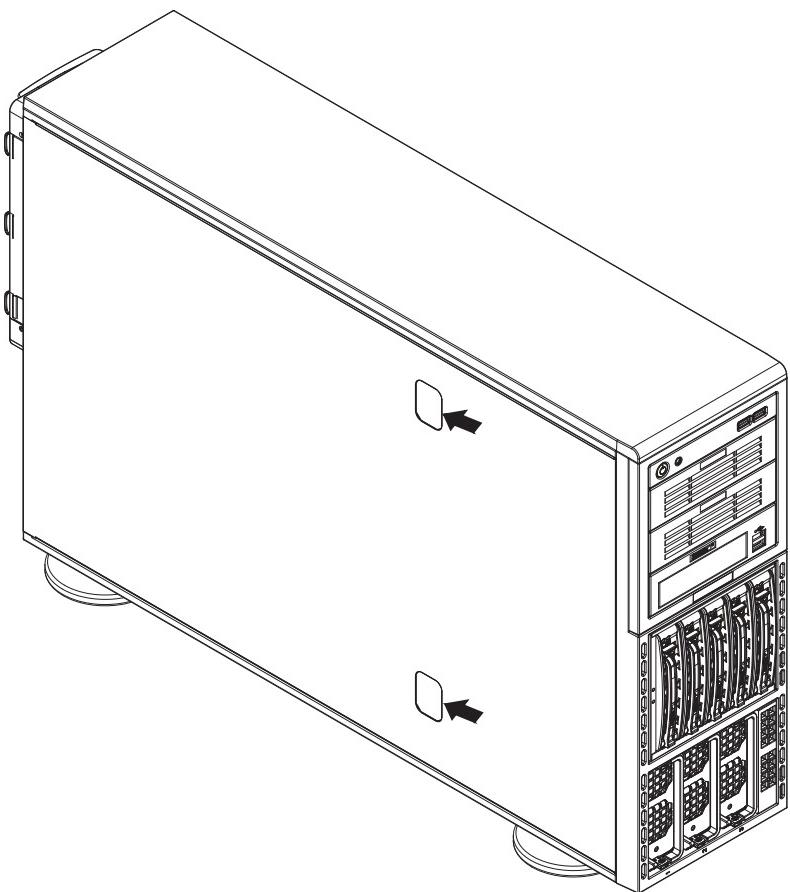
Accessing the Inside of the System

1. If rack mounted, first release the retention screws that secure the unit to the rack.
2. Grasp the two handles on either side and pull the unit straight out until it locks (you will hear a "click").
3. There are two screws that secure the cover to the chassis – remove these first.
4. Using the indentations on the side cover (see Figure 2-5), push the cover to slide it off the chassis.
5. Then lift the cover from the chassis to gain full access to the inside of the server.

Checking the Components and Setup

1. You may have four processors already installed into the serverboard. Each processor should have its own heatsink attached. See Chapter 5 for instructions on processor installation.
2. Your server may have come with system memory already installed. Make sure all DIMMs are fully seated in their slots. For details on adding system memory, refer to Chapter 5.
3. If desired, you can install add-on cards to the system. See Chapter 5 for details on installing PCI add-on cards.
4. Make sure all power and data cables are properly connected and not blocking the chassis airflow. See Chapter 5 for details on cable connections.

Figure 2-5. Accessing the Inside of the System



2-6 Checking the Drive Bay Setup

Next, you should check to make sure the peripheral drives and the SCSI drives and backplane have been properly installed and all connections have been made.

Checking the Drive Bay Setup

1. All drives can be accessed from the front of the server. For servicing the CD/DVD, floppy or other 5.25" drives, you will need to remove the top/left chassis cover. The hot-swap disk drives can be installed and removed from the front of the chassis without removing any chassis covers.
2. To install components into the 5.25" drive bays, you must first remove the top/left chassis cover as described in the previous section. Refer to Chapter 6 for details.
3. Refer to Chapter 6 if you need to install a CD/DVD and/or floppy disk drive to the system.
4. Depending upon your system's configuration, your system may have one or more drives already installed. If you need to install drives, please refer to Chapter 6.

2-7 Check the Airflow

Airflow is provided by three 9-cm hot-swap chassis fans working in conjunction with three 8-cm exhaust fans, which are located at the rear of the chassis. The system component layout was carefully designed to promote sufficient airflow through the chassis. Also note that all power and data cables have been routed in such a way that they do not block the airflow generated by the fans. Keep this in mind when you reroute them after working on the system.

2-8 Supplying Power to the System

The last thing you must do is to provide input power to the system. Plug the power cords from the power supply modules into a high-quality power strip that offers protection from electrical noise and power surges. It is recommended that you use an uninterruptible power supply (UPS). Finally, depress the power on button on the front of the chassis.

Chapter 3

System Interface

3-1 Overview

There are several LEDs on the control panel as well as others on the SAS drive carriers to keep you constantly informed of the overall status of the system as well as the activity and health of specific components. There are also two buttons on the chassis control panel and an on/off switch on the power supply. This chapter explains the meanings of all LED indicators and the appropriate response you may need to take.

3-2 Control Panel Buttons

There are two push-buttons located on the front of the chassis: a reset button and a power on/off button.

RESET



Reset

Use the reset button to reboot the system.



Power

The main power button is used to apply or remove power from the power supply to the server system. Turning off system power with this button removes the main power but keeps standby power supplied to the system.

3-3 Control Panel LEDs

The control panel located on the front of the SC748TS-R1400BP chassis has five LEDs. These LEDs provide you with critical information related to different parts of the system. This section explains what each LED indicates when illuminated and any corrective action you may need to take.



Power Fail

Indicates a power supply module has failed. The second power supply module will take the load and keep the system running but the failed module will need to be replaced. Refer to Chapter 6 for details on replacing the power supply. This LED should be off when the system is operating normally



Overheat/Fan Fail

When this LED flashes it indicates a fan failure. When on continuously (on and not flashing) it indicates an overheat condition, which may be caused by cables obstructing the airflow in the system or the ambient room temperature being too warm. Check the routing of the cables and make sure all fans are present and operating normally. You should also check to make sure that the chassis covers are installed. Finally, verify that the heatsinks are installed properly (see Chapter 5). This LED will remain flashing or on as long as the overheat condition exists.



NIC2

Indicates network activity on GLAN2 when flashing.



NIC1

Indicates network activity on GLAN1 when flashing.



HDD

Indicates IDE channel activity. On the 24042G-6RF this light indicates SAS and/or DVD-ROM drive activity when flashing.



Power

Indicates power is being supplied to the system's power supply units. This LED should normally be illuminated when the system is operating.

3-4 SAS Drive Carrier LEDs

Each SAS drive carrier has two LEDs:

- **Green:** When illuminated, the green LED on the front of the SAS drive carrier indicates drive activity. A connection to the backplane enables this LED to blink on and off when that particular drive is being accessed.
- **Red:** The SES2 compliant backplane activates the red LED to indicate a drive failure. If one of the SAS drives fail, you should be notified by your system management software. Please refer to Chapter 6 for instructions on replacing failed SAS drives.

Notes

Chapter 4

System Safety

4-1 Electrical Safety Precautions



Basic electrical safety precautions should be followed to protect yourself from harm and the A+ SERVER 4042G-6RF/TRF from damage:

- Be aware of the locations of the power on/off switch on the chassis as well as the room's emergency power-off switch, disconnection switch or electrical outlet. If an electrical accident occurs, you can then quickly remove power from the system.
- Do not work alone when working with high voltage components.
- Power should always be disconnected from the system when removing or installing main system components, such as the serverboard, memory modules and floppy drive. When disconnecting power, you should first power down the operating system first and then unplug the power cords. The unit has more than one power supply cord. Disconnect two power supply cords before servicing to avoid electrical shock.
- When working around exposed electrical circuits, another person who is familiar with the power-off controls should be nearby to switch off the power if necessary.
- Use only one hand when working with powered-on electrical equipment. This is to avoid making a complete circuit, which will cause electrical shock. Use extreme caution when using metal tools, which can easily damage any electrical components or circuit boards they come into contact with.
- Do not use mats designed to decrease static electrical discharge as protection from electrical shock. Instead, use rubber mats that have been specifically designed as electrical insulators.

- The power supply power cords must include a grounding plug and must be plugged into grounded electrical outlets.
- This product may be connected to an IT power system. In all cases, make sure that the unit is also reliably connected to Earth (ground).
- Serverboard Battery: **CAUTION** - There is a danger of explosion if the onboard battery is installed upside down, which will reverse its polarities (see Figure 4-1). This battery must be replaced only with the same or an equivalent type recommended by the manufacturer (part # CR2032). Dispose of used batteries according to the manufacturer's instructions.
- DVD-ROM Laser: **CAUTION** - this server may have come equipped with a DVD-ROM drive. To prevent direct exposure to the laser beam and hazardous radiation exposure, do not open the enclosure or use the unit in any unconventional way.
- Mainboard replaceable soldered-in fuses: Self-resetting PTC (Positive Temperature Coefficient) fuses on the mainboard must be replaced by trained service technicians only. The new fuse must be the same or equivalent as the one replaced. Contact technical support for details and support.

4-2 General Safety Precautions



Follow these rules to ensure general safety:

- Keep the area around the 4042G-6RF/TRF clean and free of clutter.
- The 4042G-6RF/TRF weighs approximately 65.5 lbs (29.8 kg) when fully loaded. When lifting the system, two people at either end should lift slowly with their feet spread out to distribute the weight. Always keep your back straight and lift with your legs.
- Place the chassis top cover and any system components that have been removed away from the system or on a table so that they won't accidentally be stepped on.

- While working on the system, do not wear loose clothing such as neckties and unbuttoned shirt sleeves, which can come into contact with electrical circuits or be pulled into a cooling fan.
- Remove any jewelry or metal objects from your body, which are excellent metal conductors that can create short circuits and harm you if they come into contact with printed circuit boards or areas where power is present.
- After accessing the inside of the system, close the system back up and secure it to the rack unit with the retention screws after ensuring that all connections have been made.

4-3 ESD Precautions



Electrostatic discharge (ESD) is generated by two objects with different electrical charges coming into contact with each other. An electrical discharge is created to neutralize this difference, which can damage electronic components and printed circuit boards. The following measures are generally sufficient to neutralize this difference before contact is made to protect your equipment from ESD:

- Use a grounded wrist strap designed to prevent static discharge.
- Keep all components and printed circuit boards (PCBs) in their antistatic bags until ready for use.
- Touch a grounded metal object before removing the board from the antistatic bag.
- Do not let components or PCBs come into contact with your clothing, which may retain a charge even if you are wearing a wrist strap.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard and peripherals back into their antistatic bags when not in use.

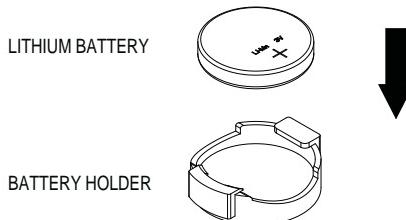
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

4-4 Operating Precautions



Care must be taken to assure that the chassis cover is in place when the 4042G-6RF/TRF is operating to assure proper cooling. Out of warranty damage to the system can occur if this practice is not strictly followed.

Figure 4-1. Installing the Onboard CR2032 Battery



Please handle used batteries carefully. Do not damage the battery in any way; a damaged battery may release hazardous materials into the environment. Do not discard a used battery in the garbage or a public landfill. Please comply with the regulations set up by your local hazardous waste management agency to dispose of your used battery properly.

Chapter 5

Advanced Serverboard Setup

This chapter covers the steps required to install the H8QG6/i-F serverboard into the chassis, connect the data and power cables and install add-on cards. All serverboard jumpers and connections are also described. A layout and quick reference chart are included in this chapter for your reference. Remember to completely close the chassis when you have finished working with the serverboard to better cool and protect the system.

5-1 Handling the Serverboard

Electrostatic discharge (ESD) can damage electronic components. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully (see previous chapter). To prevent the serverboard from bending, keep one hand under the center of the board to support it when handling. The following measures are generally sufficient to protect your equipment from electric static discharge.

Precautions

- Use a grounded wrist strap designed to prevent Electrostatic Discharge (ESD).
- Touch a grounded metal object before removing any board from its antistatic bag.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard, add-on cards and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

Unpacking

The serverboard is shipped in antistatic packaging to avoid electrical static discharge. When unpacking the board, make sure the person handling it is static protected.

5-2 Serverboard Installation

This section explains the first step of physically mounting the H8QG6/i-F into the SC748TS-R1400BP chassis. Following the steps in the order given will eliminate the most common problems encountered in such an installation. To remove the serverboard, follow the procedure in reverse order.

Installing to the Chassis

1. Access the inside of the system by removing the screws from the back lip of the top cover of the chassis, then pull the cover off.
2. The H8QG6/i-F requires a chassis big enough to support a 16.48" x 13" (418 x 330 mm) serverboard, such as Supermicro's SC748TS-R1400BP .
3. Make sure that the I/O ports on the serverboard align properly with their respective holes in the I/O shield at the back of the chassis.
4. Carefully mount the serverboard to the serverboard tray by aligning the board holes with the raised metal standoffs that are visible in the chassis.
5. Insert screws into all the mounting holes on your serverboard that line up with the standoffs and tighten until snug (if you screw them in too tight, you might strip the threads). Metal screws provide an electrical contact to the serverboard ground to provide a continuous ground for the system.
6. Finish by replacing the top cover of the chassis.

5-3 Connecting Cables

Now that the serverboard is installed, the next step is to connect the cables to the board. These include the data (ribbon) cables for the peripherals and control panel and the power cables.

Connecting Data Cables

The ribbon cables used to transfer data from the peripheral devices have been carefully routed to prevent them from blocking the flow of cooling air that moves through the system from front to back. If you need to disconnect any of these cables, you should take care to keep them routed as they were originally after reconnecting them (make sure the red wires connect to the pin 1 locations). The following data cables (with their locations noted) should be connected. (See the layout on page 5-9 for connector locations.)

- SAS/SATA drive data cables (SAS0-5/SATA0-5)
- Control Panel cable (JF1)
- DVD-ROM drive cable (J3)
- USB cable (USB5/6)
- COM port cable (COM2)

Important! Make sure the cables do not come into contact with the fans.

Connecting Power Cables

The H8QG6/i-F has a 24-pin primary power supply connector (JPW1) for connection to the ATX power supply. In addition, there are three 8-pin secondary power connectors (JPW2/3/4) that also must be connected to your power supply. See Section 5-9 for power connector pin definitions.

Connecting the Control Panel

JF1 contains header pins for various front control panel connectors. See Figure 5-1 for the pin locations of the various front control panel buttons and LED indicators.

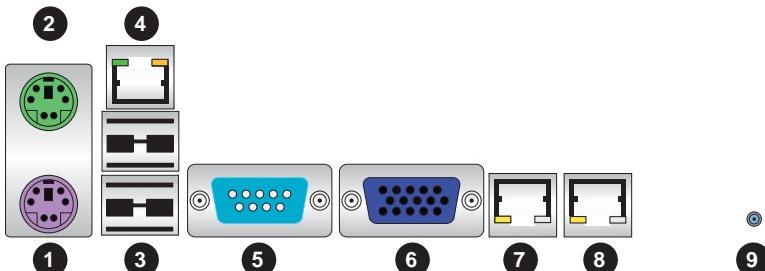
All JF1 wires have been bundled into a single ribbon cable to simplify this connection. Make sure the red wire plugs into pin 1 as marked on the board. The other end connects to the Control Panel PCB board, located just behind the system status LEDs on the chassis. See Section 5-9 for details and pin descriptions.

Figure 5-1. Control Panel Header Pins

	20	19	
Ground	●	●	No Connection
Key	●	●	Key
Power LED	●	●	3.3V
HDD LED	●	●	FP UID Switch/3.3VSB
NIC1 (Link) LED	●	●	NIC1 (Activity) LED
NIC2 (Link) LED	●	●	NIC2 (Activity) LED
OH/Fan Fail/PWR Fail/UID LED	●	●	Blue_LED_Cathode (UID)/5V SB
Power Fail LED	●	●	3.3V
Ground	●	●	Reset Button
Ground	●	●	Power Button
	2	1	

5-4 I/O Ports

The I/O ports are color coded in conformance with the PC 99 specification. See Figure 5-2 below for the colors and locations of the various I/O ports.

Figure 5-2. I/O Ports

Rear I/O Ports	
1. Keyboard	6. VGA Port
2. PS/2 Mouse	7. LAN1
3. USB0/1	8. LAN2
4. IPMI LAN	9. UID
5. COM1	

5-5 Installing the Processor and Heatsink



Exercise extreme caution when handling and installing the processor. Always connect the power cord last and always remove it before adding, removing or changing any hardware components.

Installation Procedure

Follow the procedures as listed below to install the motherboard into a chassis.

1. Install the processor(s) and the heatsink(s).
2. Install the motherboard in the chassis.
3. Install the memory and add-on cards.
4. Finally, connect the cables and install the drivers.

Installing the Processors

1. Begin by removing the cover plate that protects the CPU. Lift the lever on the CPU socket until it points straight up.



2. With the lever raised, lift open the silver CPU retention plate.



3. Use your thumb and your index finger to hold the CPU. Locate and align pin 1 of the CPU socket with pin 1 of the CPU. Both are marked with a triangle.
4. Align pin 1 of the CPU with pin 1 of the socket. Once aligned, carefully place the CPU into the socket. *Do not drop the CPU on the socket, move the CPU horizontally or vertically or rub the CPU against the socket or against any pins of the socket, which may damage the CPU and/or the socket.*
5. With the CPU inserted into the socket, inspect the four corners of the CPU to make sure that it is properly installed and flush with the socket. Then, gently lower the silver CPU retention plate into place.



6. Carefully press the CPU socket lever down until it locks into its retention tab. For a dual-CPU system, repeat these steps to install another CPU into the CPU#2 socket (and into CPU#2, #3 and #4 sockets for a quad-CPU configuration).

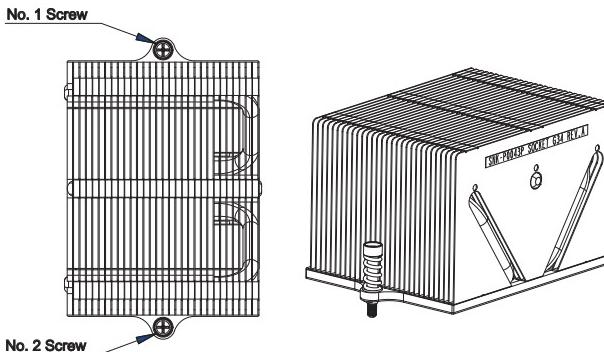


Note: in single, dual and quad-CPU configurations, memory must be installed in the DIMM slots associated with the installed CPU(s).

Installing a Passive CPU Heatsink

1. Do not apply any thermal grease to the heatsink or the CPU die -- the required amount has already been applied.
2. Place the heatsink directly on top of the CPU so that the heat sink screws are aligned with the mounting holes on the back plate.
3. Make sure the screwdriver torque setting is no more than 5.0 Kgf-cm (4.3 lbf-in) and keep the heat sink direction vertical.
4. Tighten each screw a few turns at a time while alternating between the two until fully tightened.

Figure 5-3. SNK-0043P Heatsink



Removing the Heatsink



Warning: We do not recommend removing the CPU or the heatsink. However, if you do need to remove the heatsink, please follow the instructions below to prevent damage to the CPU or other components.

1. Unscrew the heatsink screws from the motherboard a few turns at a time, alternating between the two until the screws can be removed.
2. Gently wriggle the heatsink to loosen it from the CPU. (Do not use excessive force when wriggling the heatsink!)
3. Once the heatsink is loose, remove the it from the CPU socket.
4. Clean the surface of the CPU and the heatsink, removing the used thermal grease. Reapply the proper amount of thermal grease on the surface before re-installing the CPU and the heatsink.

5-6 Installing Memory



Exercise extreme caution when installing or removing memory modules to prevent any possible damage.

Installing Memory

1. Insert each memory module vertically into its slot, paying attention to the notch along the bottom of the module to prevent inserting the module incorrectly (see Figure 2-1).
2. Install to slots CPU1/DIMM1A, CPU1/DIMM2A, CPU1/DIMM3A and CPU1/DIMM4A, etc. Always install in groups of four and in the numerical order of the DIMM slots. See support information below.
3. Gently press down on the memory module until it snaps into place.
4. With four CPUs installed, repeat step 2 to populate the CPU2 DIMM slots. Always install four DIMMs to both CPU DIMM slots for more efficient operation.

Note: 256 MB, 512 MB, 1 GB, 2 GB, 4 GB, 8 GB and 16 GB memory modules are supported. It is highly recommended that you remove the power cord from the system before installing or changing memory modules. Please refer to our web site for memory that has been tested on the H8QG6/i-F serverboard.

Support

The H8QG6/i-F serverboard supports single/dual/tri/quad-channel, DDR3-1333/1066/800 registered ECC/Unbuffered ECC/non-ECC SDRAM.

Populating four slots (CPU1/DIMM1A, CPU1/DIMM2A, CPU1/DIMM3A and CPU1/DIMM4A) at a time with memory modules of the same size and type will result in interleaved (128-bit) memory, which is faster than non-interleaved (64-bit) memory.

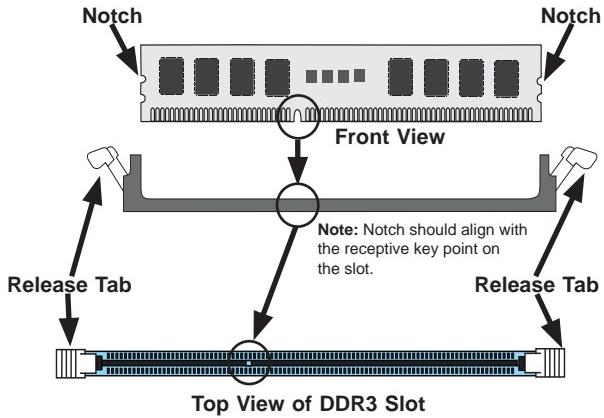
Maximum Memory

The H8QG6/i-F serverboard supports up to 512 GB of DDR3-1333/1066/800 registered ECC or 128GB of DDR3 Unbuffered ECC/non-ECC SDRAM.

Figure 5-4. Installing DIMM into Slot

To Install: Insert module vertically and press down until it snaps into place. Pay attention to the alignment notch at the bottom.

To Remove: Use your thumbs to gently push the release tabs near both ends of the module. This should release it from the slot.



**Memory Population for Optimal Performance
-For a Motherboard with One CPU (CPU1) Installed**

# DIMMS	CPU	Channel 1		Channel 2		Channel 3		Channel 4	
4 DIMMs	CPU1	P1-1A		P1-2A		P1-3A		P1-4A	
8 DIMMs	CPU1	P1-1A	P1-1B	P1-2A	P1-2B	P1-3A	P1-3B	P1-4A	P1-4B

**Memory Population for Optimal Performance
-For a Motherboard with Two CPUs (CPU1 & CPU2) Installed**

# DIMMS	CPU	Channel 1		Channel 2		Channel 3		Channel 4	
8 DIMMs	CPU1	P1-1A		P1-2A		P1-3A		P1-4A	
	CPU2	P2-1A		P2-2A		P2-3A		P2-4A	
16 DIMMs	CPU1	P1-1A	P1-1B	P1-2A	P1-2B	P1-3A	P1-3B	P1-4A	P1-4B
	CPU2	P2-1A	P2-1B	P2-2A	P2-2B	P2-3A	P2-3B	P2-4A	P2-4B

Memory Population for Optimal Performance – For a Motherboard with Four CPUs (CPU1, CPU2, CPU3 & CPU4) Installed

# DIMMS	CPU	Channel 1		Channel 2		Channel 3		Channel 4	
16 DIMMs	CPU1	P1-1A		P1-2A		P1-3A		P1-4A	
	CPU2	P2-1A		P2-2A		P2-3A		P2-4A	
	CPU3	P3-1A		P3-2A		P3-3A		P3-4A	
	CPU4	P4-1A		P4-2A		P4-3A		P4-4A	
32 DIMMs	CPU1	P1-1A	P1-1B	P1-2A	P1-2B	P1-3A	P1-3B	P1-4A	P1-4B
	CPU2	P2-1A	P2-1B	P2-2A	P2-2B	P2-3A	P2-3B	P2-4A	P2-4B
	CPU3	P3-1A	P3-1B	P3-2A	P3-2B	P3-3A	P3-3B	P3-4A	P3-4B
	CPU4	P4-1A	P4-1B	P4-2A	P4-2B	P4-3A	P4-3B	P4-4A	P4-4B

DIMM Module Population Configuration

For memory to work properly, follow the tables below for memory installation:

Per Channel DIMM Populations Options					
DIMM Type	DIMM A	DIMM B	Max. MHz, 1.5V DIMMs	Max. MHz, 1.35V DIMMs	Max. GB/ Channel
Unbuffered DIMM	SR or DR	Empty	1333 MHz	1333 MHz	8 GB
	SR	SR			
	DR	DR			
Registered DIMM	SR or DR	Empty	1333 MHz	1333 MHz	16 GB
	SR	SR			
	DR	DR			
	QR	Empty	1333 MHz	1066 MHz	16 GB
	QR	QR	1066 MHz	800 MHz	32 GB

Note 1: Due to OS limitations, some operating systems may not show more than 4 GB of memory.

Note 2: Due to memory allocation to system devices, the amount of memory that remains available for operational use will be reduced when 4 GB of RAM is used. The reduction in memory availability is disproportional.

Possible System Memory Allocation & Availability		
System Device	Size	Physical Memory Available (4 GB Total System Memory)
Firmware Hub flash memory (System BIOS)	1 MB	3.99 GB
Local APIC	4 KB	3.99 GB
Area Reserved for the chipset	2 MB	3.99 GB
I/O APIC (4 Kbytes)	4 KB	3.99 GB
PCI Enumeration Area 1	256 MB	3.76 GB
PCI Express (256 MB)	256 MB	3.51 GB
PCI Enumeration Area 2 (if needed) -Aligned on 256-M boundary-	512 MB	3.01 GB
VGA Memory	16 MB	2.85 GB
TSEG	1 MB	2.84 GB
Memory available for the OS & other applications		2.84 GB

5-7 Adding PCI Add-On Cards

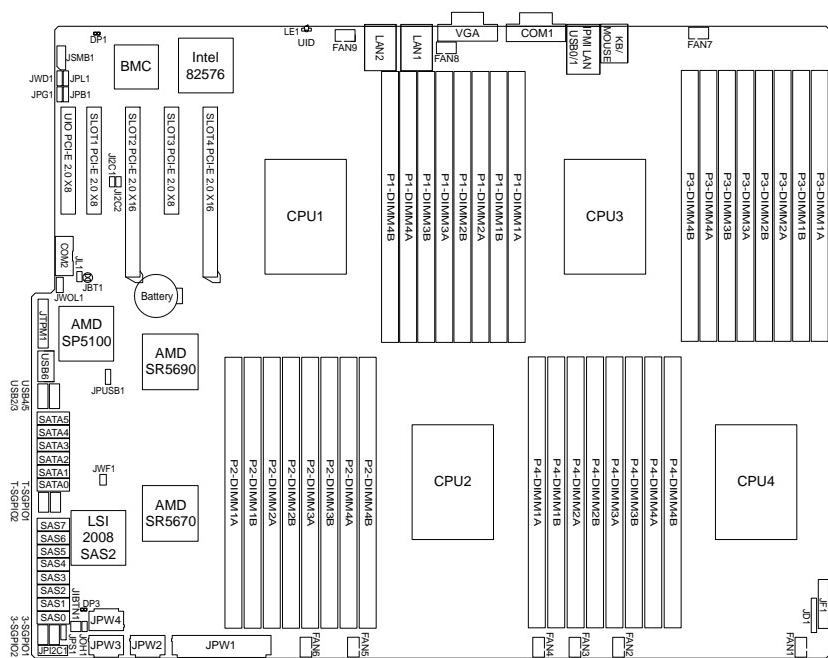
Use the procedure below to add PCI add-on cards to your server.

Installing a PCI Expansion Card

1. Confirm that you are using a PCI-E or UIO card and have an available slot to support the card.
2. Remove the chassis cover.
3. Choose the PCI slot shield in which to place the add-on card.
4. In that slot, open the PCI slot shield lever and slide the shield sideways.
5. From inside the chassis, remove the PCI slot shield.
6. Insert the add-on card into the appropriate slot and attach the add-on card bracket in place of the PCI slot shield.
7. Secure the add-on card by closing the PCI slot shield lever.
8. Connect cables to the add-on card as necessary.

5-8 Serverboard Details

Figure 5-5. H8QG6/i-F Layout
(not drawn to scale)



Notes:

Jumpers not indicated are for test purposes only.

Not all ports, jumpers or LED Indicators are available on all serverboards.

H8QG6/i-F Quick Reference

Jumper	Description	Default Setting
JBT1	CMOS Clear	(See Section 2-7)
JI ² C1/JI ² C2	I ² C to PCI-E Slot Enable/Disable	Both Closed (Enabled)
JPB1	BMC Enable/Disable	Pins 1-2 (Enabled)
JPG1	VGA Enable/Disable	Pins 1-2 (Enabled)
JPL1	LAN 1/2 Enable/Disable	Pins 1-2 (Enabled)
JPS1	SAS Controller Enable/Disable	Pins 1-2 (Enabled)
JPUSB1	USB Wakeup	Pins 1-2 (Enabled)
JWD1	Watch Dog	Pins 1-2 (Reset)

LED	Description
LAN Ports	LEDs for the LAN Ethernet ports
Dedicated IPMI LAN	LEDs for the dedicated IPMI LAN Ethernet port
LE1	LED for UID Button
DP1	LED for IPMI Heartbeat
DP3	LED for Serverboard Power-On
Connector	Description
COM1/COM2	COM1 Serial Port/Header
FAN 1-9	Chassis/CPU Fan Headers
IPMI LAN	Dedicated IPMI LAN Port
JD1	Speaker Header
JF1	Front Panel Connector
JIBTN1	RAIDKey for RAID 5 SAS support
JL1	Chassis Intrusion Header
JOH1	Overheat Warning Header
JPI2C1	Power I ² C Header
JPW1	24-pin Main ATX Power Connector
JPW2/3/4	+12V 8-pin CPU Power Connectors
JSMB1	System Management Bus Header (SMBus)
JTPM1	Trusted Platform Module Header
JWF1	Compact Flash Card Power Connector
JWOL1	Wake-On-LAN Header
LAN1/2	Gigabit Ethernet (RJ45) Ports
PS2 Mouse/Keyboard	PS2 Mouse/Keyboard connectors
SAS0~3, SAS4~7	SAS Ports (only on H8QG6/i-F)
SATA0 ~ SATA5	SATA Ports
3-SGPIO1/3-SGPIO2	Serial General Purpose I/O Header for SAS
T-SGPIO-1/TSGPIO-2	Serial General Purpose Input/Output Header for SATA
UID	Unit Identifier Button
USB0/1, USB6, USB2/3, USB4/5	Universal Serial Bus (USB) Ports, Type-A Ports and Headers
VGA	VGA Connector

5-9 Connector Definitions

Power Connectors

A 24-pin main power supply connector(JPW1) and three 8-pin CPU PWR connectors (JPW2/JPW3/JPW4) on the motherboard. These power connectors meet the SSI EPS 12V specification. In addition to the 24-pin ATX power connector, the 12V 8-pin CPU PWR connectors at JPW2/JPW3/JPW4 must also be connected to your power supply. See the table on the right for pin definitions.

Warning: To prevent damage to the power supply or motherboard, please use a power supply that contains a 24-pin and three 8-pin power connectors. Be sure to connect these connectors to the 24-pin (JPW1) and the three 8-pin (JPW2,JPW3 and JPW4) power connectors on the motherboard. Failure in doing so will void the manufacturer warranty on your power supply and motherboard.

Power Button

The Power Button connection is located on pins 1 and 2 of JF1. Momentarily contacting both pins will power on/off the system. This button can also be configured to function as a suspend button (with a setting in the BIOS - see Chapter 4). To turn off the power when set to suspend mode, press the button for at least 4 seconds. Refer to the table on the right for pin definitions.

Reset Connector

The reset connector is located on pins 3 and 4 of JF1 and attaches to the reset switch on the computer chassis. See the table on the right for pin definitions.

ATX Power 24-pin Connector Pin Definitions			
Pin#	Definition	Pin #	Definition
13	+3.3V	1	+3.3V
14	-12V	2	+3.3V
15	COM	3	COM
16	PS_ON	4	+5V
17	COM	5	COM
18	COM	6	+5V
19	COM	7	COM
20	Res (NC)	8	PWR_OK
21	+5V	9	5VSB
22	+5V	10	+12V
23	+5V	11	+12V
24	COM	12	+3.3V

12V 8-pin PWR Connector Pin Definitions	
Pins	Definition
1 through 4	Ground
5 through 8	+12V

Required Connection

Power Button Pin Definitions (JF1)	
Pin#	Definition
1	PWR
2	Ground

Reset Button Pin Definitions (JF1)	
Pin#	Definition
3	Reset
4	Ground

Power Fail LED

The Power Fail LED connection is located on pins 5 and 6 of JF1. Refer to the table on the right for pin definitions.

PWR Fail LED Pin Definitions (JF1)	
Pin#	Definition
5	3.3V
6	PWR Fail LED

Overheat (OH)/Fan Fail/PWR Fail/UID LED

Connect an LED cable to pins 7 and 8 of JF1 to use the Overheat/Fan Fail/Power Fail and UID LED connections. The Red LED on pin 8 provides warnings of an overheat, fan failure or power failure. The Blue LED on pin 7 works as the UID LED indicator for the front panel UID switch located on pins 13~14 of JF1. When Jumper J_UID_OW is set to off (default), the Red LED takes precedence over the Blue LED. (See Page 2-19 for details.) Refer to the table on the right for pin definitions.

OH/Fan Fail/ PWR Fail/Blue_UID LED Pin Definitions (JF1)	
Pin#	Definition
7	Blue_LED-Cathode(UID)/5.5V.SB
8	OH/Fan Fail/PWR Fail/UID LED (Red)

OH/Fan Fail/PWR Fail LED Status (Red LED)	
State	Indication
Off	Normal
On	Overheat
Flashing	Fan Fail

HDD/FP UID Switch

The HDD/UID Switch connections are located on pins 13/14 of JF1. Attach a hard-drive LED cable to display HDD or SATA activities. This connection can also be used as a front panel UID (Unit Identifier) switch. The UID LED on Pin 7 of JF1 works in conjunction with this UID Switch. When the user presses and releases the UID switch, the UID LED will be turned on or off to indicate the location of the unit. (Refer to Page 2-11 for more details.)

HDD/UID Switch Pin Definitions (JF1)	
Pin#	Definition
13	UID Signal/3.3V
14	HDD Active

Power LED Connector

The Power LED connector is on pins 15 and 16 of JF1. See the table on the right for pin definitions.

Power LED Pin Definitions (JF1)	
Pin#	Definition
15	PW_ON
16	Ground

Universal Serial Bus Ports

Two Universal Serial Bus ports (USB 2.0) are located beside the Keyboard and Mouse PS2 ports. One additional Type A port (USB6) is also included on the motherboard. See the table on the right for pin definitions.

Universal Serial Bus Ports Pin Definitions (USB0/1, USB6)			
USB0 Pin #	Definition	USB1 Pin #	Definition
1	+5V	1	+5V
2	PO-	2	PO-
3	PO+	3	PO+
4	Ground	4	Ground

USB Headers

Four USB 2.0 headers (USB2/3 and USB4/5) are also included on the motherboard. These may be connected to provide front side access. A USB cable (not included) is needed for the connection. See the table on the right for pin definitions.

Universal Serial Bus Headers Pin Definitions (USB2/3, USB4/5)			
USB2 Pin #	Definition	USB3 Pin #	Definition
1	+5V	1	+5V
2	PO-	2	PO-
3	PO+	3	PO+
4	Ground	4	Ground
5	Key	5	NC

Note: NC indicates no connection.

Fan Headers

This motherboard has nine fan headers (Fan1 to Fan9). These 4-pin fans headers are backward compatible with 3-pin fans. However, fan speed control is available for 4-pin fans only. The fan speeds are controlled by the BIOS. See the table on the right for pin definitions

Fan Header Pin Definitions	
Pin#	Definition
1	Ground
2	+12V
3	Tachometer
4	PWR Modulation

Serial Ports

The COM1 serial port is located beside the VGA port. Refer to the motherboard layout for the location of the COM2 header. See the table on the right for pin definitions.

Serial Port Pin Definitions (COM1/COM2)			
Pin #	Definition	Pin #	Definition
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	Ground	10	NC

Note: NC indicates no connection.

Video Connector

A Video (VGA) connector is located below the COM Port on the IO backplane. This connector is used to provide video and CRT display.

SGPIO

The T-SGPIO1/ T-SGPIO2 (Serial General Purpose Input/Output) headers provide a bus between the SATA controller and the backplane to provide SATA enclosure management functions. Connect the appropriate cable from the backplane to the T-SGPIO1 header to utilize SATA management functions on your system.

Likewise, the 3-SGPIO1/3-SGPIO2 headers provide the same function between the SAS controller and the backplane, and have the same pin definitions (only on H8QG6/i-F).

SGPIO Header Pin Definitions (T-SGPIO1/TSGPIO2) (3SGPIO1/3SGPIO2))			
Pin#	Definition	Pin #	Definition
1	NC	2	NC
3	Ground	4	Data
5	Load	6	Ground
7	NC	8	NC

Note: NC indicates no connection.

SMBus Header

The header at SMBus is for the System Management Bus. Connect the appropriate cable here to utilize SMB on the system. See the table on the right for pin definitions.

SMBus Header (SMBus) Pin Definitions (JSMB1)	
Pin#	Definition
1	Data
2	Ground
3	Clock
4	No Connection

Wake-On-LAN

The Wake-On-LAN header is designated JWOL. See the table on the right for pin definitions. You must have a LAN card with a Wake-On-LAN connector and cable to use the Wake-On-LAN feature.

Wake-On-LAN Pin Definitions (JWOL)	
Pin#	Definition
1	+5V Standby
2	Ground
3	Wake-up

Power I²C

The JPI2C1 header is for power I²C, which may be used to monitor the status of the power supply, fan and system temperature. See the table on the right for pin definitions.

Power I²C Pin Definitions (JPI2C)	
Pin#	Definition
1	Data
2	Ground
3	Clock
4	NC

Chassis Intrusion

A Chassis Intrusion header is located at JL1. Attach the appropriate cable to inform you of a chassis intrusion.

Chassis Intrusion Pin Definitions (JL1)

Pin#	Definition
1	Battery voltage
2	Intrusion signal

Overheat LED

Connect an LED to the JOH1 header to provide warning of chassis overheating. See the table on the right for pin definitions.

Overheat LED Pin Definitions (JOH1)

Pin#	Definition
1	3.3V
2	OH Active

Power LED/Speaker

On the JD1 header, pins 1~3 are used for power LED indication, and pins 4~7 are for the speaker. See the tables on the right for pin definitions. If you wish to use the onboard speaker, you should close pins 6~7 with a jumper. Connect a cable to pins 4~7 of JD1 to use an external speaker.

PWR LED Connector Pin Definitions

Pin Setting	Definition
Pin 1	Anode (+)
Pin2	Cathode (-)
Pin3	NA

Speaker Connector Pin Definitions

Pin Setting	Definition
Pins 4~7	External Speaker
Pins 6~7	Internal Speaker

ATX PS/2 Keyboard and PS/2 Mouse Ports

The ATX PS/2 keyboard and PS/2 mouse are located next to the Back Panel USB Ports 0~3 on the motherboard. See the table at right for pin definitions.

PS/2 Keyboard/Mouse Pin Definitions

PS2 Keyboard		PS2 Mouse	
Pin#	Definition	Pin#	Definition
1	KB Data	1	Mouse Data
2	No Connection	2	No Connection
3	Ground	3	Ground
4	Mouse/KB VCC (+5V)	4	Mouse/KB VCC (+5V)
5	KB Clock	5	Mouse Clock
6	No Connection	6	No Connection

VCC: with 1.5A PTC (current limit)

Unit Identifier Button

There is a Unit Identifier (UID) button on the rear I/O of the board. There is also another UID button located on the control panel. When you push either UID button, both Rear UID and Front Panel UID Indicators will illuminate. Push either button again to turn off both indicators. These UID indicators provide easy identification of a system unit that may be in need of service.

UID Button Pin Definitions	
Pin#	Definition
1	Ground
2	Ground
3	Button In
4	Ground

Trusted Platform Module Header

This header is used to connect a Trusted Platform Module (TPM), available separately from a third-party vendor. A TPM is a security device that allows encryption and authentication of hard drives, disallowing access if the TPM associated with it is not installed in the system. See the table on the right for pin definitions.

Trusted Platform Module Header Pin Definitions (JTPM1)			
Pin#	Definition	Pin#	Definition
1	LCLK		GND
3	LFRAME		No Pin
5	LRESET		VCC5
7	LAD3		LAD2
9	VCC3		LAD1
11	LAD0		GND
13	RSV0		RSV1
15	SB3V		SERIRQ
17	GND		CLKRUN
19	LPCPD		RSV2

LAN1/2 (Ethernet Ports)

Two Gigabit Ethernet ports (designated LAN1 and LAN2) are located beside the VGA port. Additionally, there is a dedicated LAN port for IPMI on top of the two rear USB ports. These Ethernet ports accept RJ45 type cables.



JIBTN1 Header

A RAIDKey header, located at JIBTN1, provides RAID function support in order to use RAID 5 SAS support.

Compact Flash Card PWR Connector

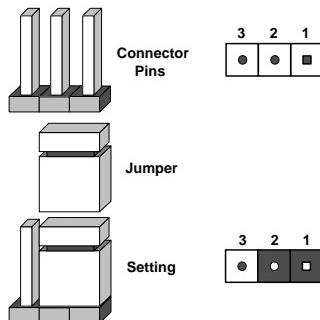
A Compact Flash Card Power Connector is located at JWF1.

5-10 Jumper Settings

Explanation of Jumpers

To modify the operation of the motherboard, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. See the diagram at right for an example of jumping pins 1 and 2. Refer to the motherboard layout page for jumper locations.

Note: On two-pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.



JBT1 contact pads

CMOS Clear

JBT1 is used to clear CMOS, which will also clear any passwords. Instead of pins, this jumper consists of contact pads to prevent accidentally clearing the contents of CMOS.

To Clear CMOS

1. First power down the system and unplug the power cord(s).
2. With the power disconnected, short the CMOS pads with a metal object such as a small screwdriver.
3. Remove the screwdriver (or shorting device).
4. Reconnect the power cord(s) and power on the system.

Note: Do not use the PW ON connector to clear CMOS.

I²C to PCI-Express Slot

J^{I²C1/J^{I²C2}} allows you to enable the I²C bus to communicate with the PCI-Express slot. For the jumpers to work properly, please set both jumpers to the same setting. If enabled, both jumpers must be enabled. If disabled, both jumpers must be disabled. See the table on the right for jumper settings.

I ² C to PCI-Express Slot Jumper Settings (J ^{I²C1/J^{I²C2}})	
Jumper Setting	Definition
Closed	Enabled
Open	Disabled

Watch Dog Enable/Disable

JWD1 enables the Watch Dog function, a system monitor that takes action when a software application freezes the system. Jumping pins 1-2 will have WD reboot the system if a program freezes. Jumping pins 2-3 will generate a non-maskable interrupt for the program that has frozen. See the table on the right for jumper settings. [Watch Dog must also be enabled in BIOS.](#)

Watch Dog Jumper Settings (JWD1)	
Jumper Setting	Definition
Pins 1-2	Reset
Pins 2-3	NMI
Open	Disabled

Note: when Watch Dog is enabled, the user must write their own application software to disable the Watch Dog Timer.

VGA Enable/Disable

JPG1 allows you to enable or disable the VGA port. The default position is on pins 1 and 2 to enable VGA. See the table on the right for jumper settings.

VGA Enable/Disable Jumper Settings (JPG1)	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

LAN1/2 Enable/Disable

Change the setting of jumper JPL1 to enable to enable or disable the LAN1 and LAN2 Ethernets ports. See the table on the right for jumper settings. The default setting is enabled.

LAN1/2 En/Disable Jumper Settings (JPL1)	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

SAS Enable/Disable

JPS1 allows you to enable or disable the SAS controller. The default position is on pins 1 and 2 to enable SAS. See the table on the right for jumper settings.

SAS Enable/Disable Jumper Settings (JPS1)	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

USB Wake-Up

JPUSB1 jumper allows you to "wake up" the system by pressing a key on the USB keyboard or by clicking the USB mouse of your system. These jumpers are used in conjunction with the USB Wake-Up function in the BIOS. See the table on the right for jumper settings and jumper connections. (the default is Enabled)

Backpanel USB Wake-Up Enable (JPUSB1) Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Enabled (default)
Pins 2-3	Disabled

BMC Jumper

JPB1 is used to enable or disable the BMC (Baseboard Management Control) Chip and the onboard IPMI connection. This jumper is used together with the IPMI settings in the BIOS. The default position is on pins 1 and 2 to Enable BMC. See the table on the right for jumper settings.

BMC Jumper Enable (JPB1) Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Enabled (default)
Pins 2-3	Disabled

5-11 Onboard Indicators

LAN1/LAN2 LEDs

The Ethernet ports (located beside the VGA port) have two LEDs. On each Gb LAN port, one LED blinks to indicate activity while the other may be green, amber or off to indicate the speed of the connection. See the table on the right for the functions associated with the connection speed LED.

LAN LED (Connection Speed Indicator)	
LED Color	Definition
Off	10 MHz
Green	100 MHz
Amber	1 GHz

Dedicated IPMI LAN LEDs

A dedicated IPMI LAN is also included on the H8QG6/i-F serverboard. The amber LED on the right indicates activity, while the green LED on the left indicates the speed of the connection. See the table at right for more information.

IPMI LAN Link LED (Left) & Activity LED (Right)		
Color	Status	Definition
Link (Left)	Green: Solid	100 Mb/s
Activity (Right)	Amber: Blinking	Active

Power LED

DP3 is an Onboard Power LED. When this LED is lit, it means power is present on the serverboard. Be sure to turn off the system and unplug the power cord(s) before removing or installing components.

Power LED (DP3)	
State	System Status
On	Standby power present on motherboard
Off	No power connected

IPMI LED

The serverboard contains an IPMI LED (DP1) located near the corner above the PCI-E slots. When this LED is lit, it means a connection is active for the built-in IPMI on the serverboard.

IPMI LED (DP1)	
State	System Status
On	Active connection
Off	No connection

Note: This LED is not installed on non-IPMI boards.

UID LED (LE1)

A rear UID LED Indicator, located at LE1, works in conjunction with the rear UID switch to provide easy identification for a unit that might be in need of service. Refer to Page 5-19 for further UID details.

5-12 SAS and SATA Drive Connections

SATA Ports

There are no jumpers to configure the SATA ports, which are designated SATA0 through SATA5. See the table on the right for pin definitions.

SATA Ports Pin Definitions (SATA0-SATA5)	
Pin #	Definition
1	Ground
2	TXP
3	TXN
4	Ground
5	RXN
6	RXP
7	Ground

SAS Ports

There are eight SAS ports included on the motherboard. See the table on the right for pin definitions.

Note: JPS1 must be set correctly to enable the SAS controller.

SAS Ports Pin Definitions (SAS0 ~ SAS7)			
Pin#	Definition	Pin #	Definition
1	Ground	2	TXP
3	TXN	4	Ground
5	RXN	6	RXP
7	Ground		

5-13 Enabling SATA RAID

Now that the hardware is set up, you must install the operating system and the SATA RAID drivers, if you wish to use RAID with your SATA drives. The installation procedure differs depending on whether you wish to have the operating system installed on a RAID array or on a separate non-RAID drive. See the instructions below for details.

Serial ATA (SATA)

Serial ATA (SATA) is a physical storage interface that employs a single cable with a minimum of four wires to create a point-to-point connection between devices. This connection is a serial link that supports a SATA transfer rate from 300 MBps. The serial cables used in SATA are thinner than the traditional cables used in Parallel ATA (PATA) and can extend up to one meter in length, compared to only 40 cm for PATA cables. Overall, SATA provides better functionality than PATA.

Installing the OS/SATA Driver

Before installing the OS (operating system) and SATA RAID driver, you must decide if you wish to have the operating system installed as part of a bootable RAID array or installed to a separate non-RAID hard drive. If on a separate drive, you may install the driver either during or after the OS installation. If you wish to have the OS on a SATA RAID array, you must follow the procedure below and install the driver during the OS installation.

Building a Driver Diskette

You must first build a driver diskette from the Supermicro CD-ROM that was included with the system. (You will have to create this disk on a computer that is already running and with the OS installed.)

Building a Driver Diskette

1. Insert the CD into your CD-ROM drive and start the system. A display as shown in Figure 5-8 will appear.
2. Click on the icon labeled "Build Driver Diskettes and Manuals" and follow the instructions to create a floppy disk with the driver on it.
3. Once it's been created, remove the floppy and insert the installation CD for the Windows Operating System you wish to install into the CD-ROM drive of the new system you are about to configure.

Note: You need to have an external USB floppy when building the driver diskette. Window's Vista, Windows 2008 or later Windows OS systems can use a USB stick instead of a floppy.

Enabling SATA RAID in the BIOS

Before installing the Windows Operating System, you must change some settings in BIOS. Boot up the system and hit the key to enter the BIOS Setup Utility. After the Setup Utility loads,

1. Use the arrow keys to move to the Exit menu. Scroll down with the arrow keys to the "Load Optimal Defaults" setting and press <Enter>. Select "OK" to confirm, then <Enter> to load the default settings.
2. Use the arrow keys to move to the "Advanced" menu, then scroll down to "IDE/SATA Configuration" and press the <Enter> key. Once in this submenu, scroll down to "OnChip SATA Type" and choose the "RAID" option (see Figure 2-4).

Figure 5-6. BIOS Setup Screen



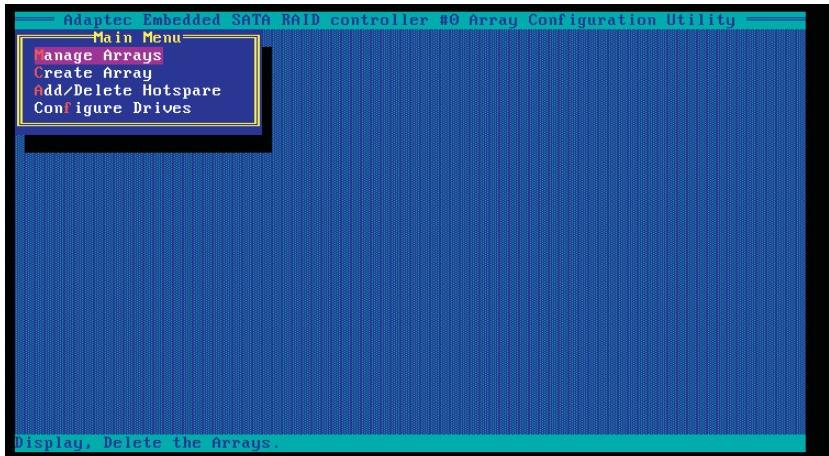
3. Hit the <Esc> key twice and scroll to the Exit menu. Select "Save Changes and Exit" and hit <enter>, then hit <Enter> again to verify.

4. After exiting the BIOS Setup Utility, the system will reboot. When prompted during the startup, press the <CTRL+A> key when prompted to run the Dot-Hill RAID Utility program (see Figure 5-7).

Using the Adaptec RAID Utility

The Adaptec® RAID Utility program is where you can define the drives you want to include in the RAID array and the mode and type of RAID.

Figure 5-7.Adaptec RAID Utility Program Screen



Installing the RAID Driver During OS Installation

You may also use the procedure below to install the RAID driver during the Windows's OS installation:

5. With the Windows OS installation CD in the CD-ROM drive, restart the system.
6. When you see the prompt, hit the <F6> key to enter Windows setup.
7. Eventually a blue screen will appear with a message that begins "Windows could not determine the type of one or more storage devices . ." When you see the screen, hit the <S> key to "Specify Additional Device", then insert the driver diskette you just created into the floppy drive.
8. Highlight "Manufacturer Supplied Hardware Support Disk" and hit the <Enter> key.

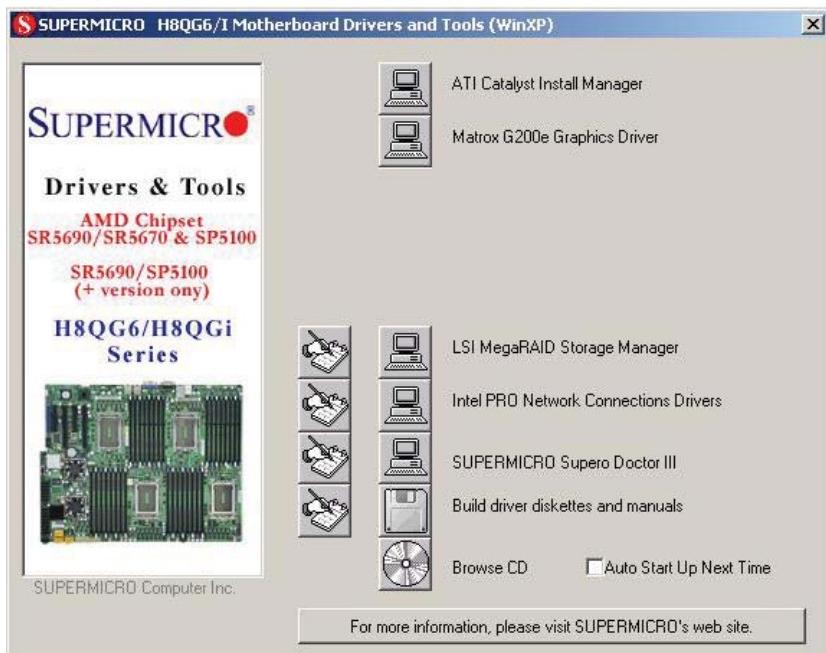
9. Highlight the first "Adaptec RAID" driver shown and press the <Enter> key to install it.
10. Press <Enter> again to continue with the Windows setup.

5-14 Installing Drivers

The CD that came bundled with the system contains drivers, some of which must be installed, such as the chipset driver. After inserting this CD into your CD-ROM drive, the display shown in Figure 5-8 should appear. (If this display does not appear, click on the My Computer icon and then on the icon representing your CD-ROM drive. Finally, double click on the S "Setup" icon.)

Click the icons showing a hand writing on paper to view the readme files for each item. Click the computer icons to the right of these items to install each item (from top to the bottom) one at a time. After installing each item, you should reboot the system before moving on to the next item on the list. The bottom icon with a CD on it allows you to view the entire contents of the CD.

Figure 5-8. Driver/Tool Installation Display Screen



Supero Doctor III

The Supero Doctor III program is a Web base management tool that supports remote management capability. It includes Remote and Local Management tools. The local management is called SD III Client. The Supero Doctor III program included on the CD-ROM that came with your motherboard allows you to monitor the environment and operations of your system. Supero Doctor III displays crucial system information such as CPU temperature, system voltages and fan status. See the Figure below for a display of the Supero Doctor III interface.

Note: The default User Name and Password for Supero Doctor III is ADMIN / ADMIN.

Note: When Supero Doctor III is first installed, it adopts the temperature threshold settings that have been set in BIOS. Any subsequent changes to these thresholds must be made within Supero Doctor, as the Supero Doctor settings override the BIOS settings. To set the BIOS temperature threshold settings again, you would first need to uninstall Supero Doctor III.

Figure 5-9. Supero Doctor III Interface Display Screen (Health Information)

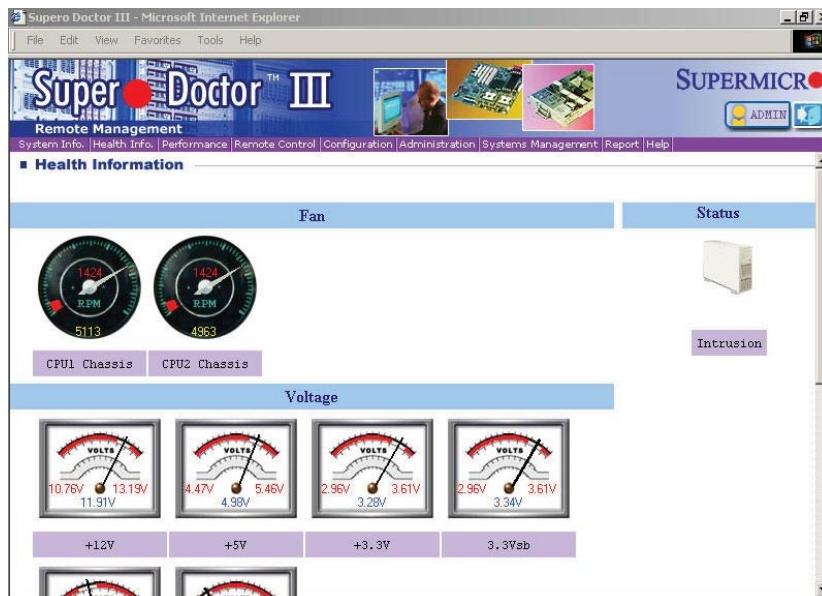


Figure 5-10. Supero Doctor III Interface Display Screen (Remote Control)

The screenshot shows a Microsoft Internet Explorer window titled "Supero Doctor III - Microsoft Internet Explorer". The menu bar includes File, Edit, View, Favorites, Tools, and Help. The main content area features the "Supero Doctor III" logo with "Remote Management" below it. A navigation bar at the top right includes links for System Info, Health Info, Performance, Remote Control, Configuration, Administration, Systems Management, Report, and Help. On the right side, there is a "SUPERMICRO" logo and "ADMIN" status indicators. The central part of the screen displays a blue remote control interface with a digital keypad and a liquid crystal display (LCD) screen. The LCD screen shows the text "Graceful Power Control" and "Power Control" with arrows indicating selection. Below the screen are four physical buttons: a yellow circular button with a plug icon, a red power button, a green "Enter" button, and a blue "Comm." button with a serial port icon. The overall theme is a web-based management interface for server hardware.

Graceful power control

Supero Doctor III allows a user to inform the OS to reboot or shut down within a specified time (the default is 30 seconds). Before the system reboots or shuts down, it's allowed to cancel the action.

Requirements

Keep Supero SD3Service Daemon running at all times on this system.
Provide TCP/IP connectivity.

Power control

Note: Supero Doctor III Software Revision 1.0 can be downloaded from our Web Site at: ftp://ftp.supermicro.com/utility/Supero_Doctor_III/. You can also download the Supero Doctor III User's Guide at: <<http://www.supermicro.com/products/Accessories/software/SuperODoctorIII.cfm>>. For Linux, we recommend that you use the Supero Doctor II application instead.

Chapter 6

Advanced Chassis Setup

This chapter covers the steps required to install components and perform simple maintenance on the SC748TS-R1400BP chassis. Following the component installation steps in the order given will eliminate most common problems. If some steps are unnecessary, skip ahead to the step that follows. Refer to Chapter 2 for instructions on installing the system as a 4U rackmount.

Tools Required: The only tool you will need is a Philips screwdriver.

6-1 Static-Sensitive Devices

Static electrical discharge can damage electronic components. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully. The following measures are generally sufficient to protect your equipment from static discharge.

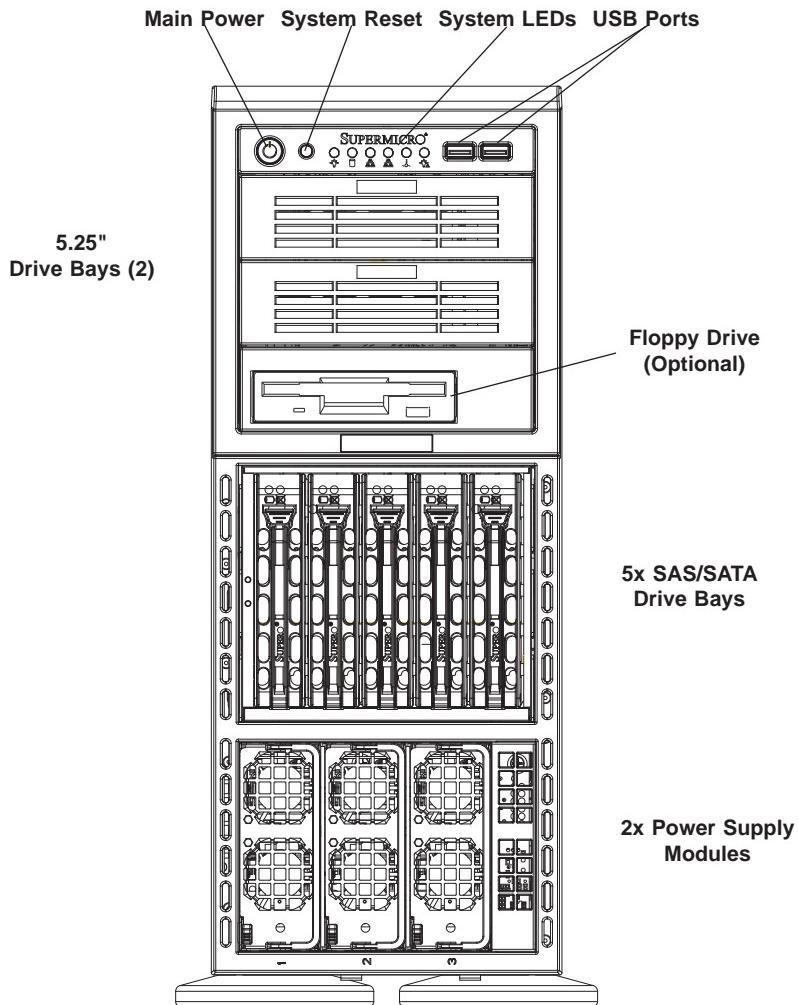
Precautions

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing any board from its antistatic bag.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard, add-on cards and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

Unpacking

The serverboard is shipped in antistatic packaging. When unpacking the board, make sure the person handling it is static protected.

Figure 6-1. Chassis Front View



6-2 Control Panel

The front control panel must be connected to the JF1 connector on the serverboard to provide you with system status and alarm indications. A ribbon cable has bundled these wires together to simplify this connection. Connect the cable from JF1 on the serverboard (making sure the red wire plugs into pin 1) to the appropriate connector on the front control panel PCB (printed circuit board). Pull all excess cabling over to the control panel side of the chassis. The LEDs on the control panel inform you of system status – see Figure 6-2 for details. See Chapter 5 for details on JF1.

6-3 System Fans

Three 9-cm chassis cooling fans (located in the center of the chassis) provide cooling airflow while three 8-cm exhaust fans expel hot air from the chassis. The fans should all be connected to headers on the serverboard (see Chapter 5). Each power supply module also has a cooling fan.

Fan Failure

Under normal operation all chassis fans, exhaust fans and the power supply fans run continuously. The chassis fans are hot-swappable and can be replaced without powering down the system.

Replacing Chassis Fans

Identifying the Failed Fan.

1. To locate and replace a failed chassis fan, begin by removing the top/left chassis cover (see Chapter 2 for details on removing the cover).
2. Locate the fan that has stopped working.

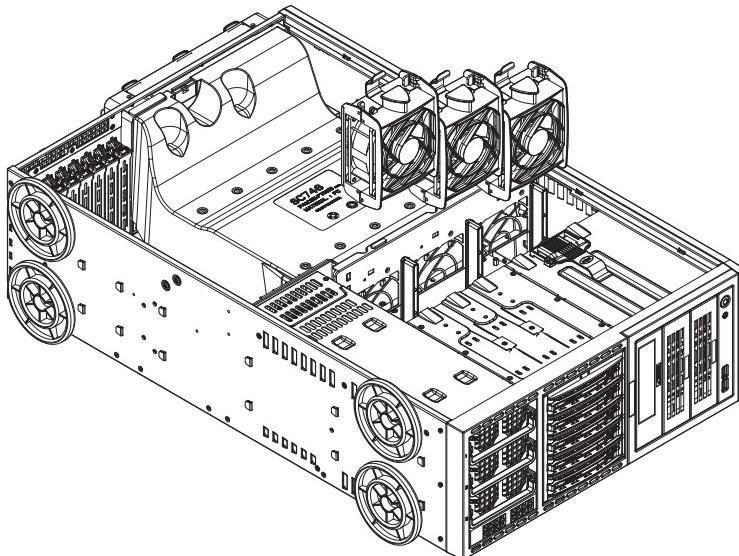
Removing a Hot-plug Fan Housing.

1. Depress the locking tab on the failed fan: on a chassis fan, push the tab on the side of the housing inward, on the exhaust fan push down on the colored tab.
2. With the tab depressed, pull the fan straight out (see Figure 6-3). The wiring for these fans has been designed to detach automatically.

Installing a New System Fan.

1. Replace the failed fan with an identical one (available from Supermicro).
2. Install it in the same position and orientation as the one you removed; it should click into place when fully inserted.
3. Check that the fan is working then replace the top/left side chassis panel.

Figure 6-3. Removing a Chassis Fan



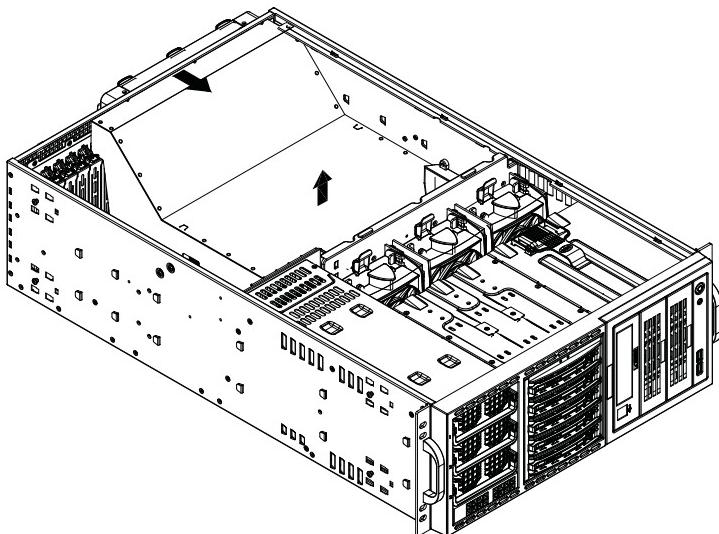
6-4 Removing the Air Shroud

Under most circumstances you will not need to remove the air shroud to perform any service on the system. However, if you wish to temporarily remove it (the air shroud should always be in place when the system is operating), please follow this procedure.

Removing the Air Shroud

1. Begin by depressing the tabs at the front and rear of the shroud to unlock it, then lift it up and out of the chassis (see Figure 6-4).
2. To reinstall, simply position the air shroud in its proper place and push it in until you hear it click.

Figure 6-4. Removing the Air Shroud



6-4 Drive Bay Installation

SAS/SATA Drives

A total of five SAS/SATA drives may be housed in the SC748TS-R1400BP chassis. The drive IDs are preconfigured as 0 through 4 (channel A) in order from bottom to top (or from left to right if rackmounted).

Installing/Removing Hot-swap Drives

The SAS/SATA drive carriers are all easily accessible at the front of the chassis. These drives are hot-swappable, meaning they can be removed and installed without powering down the system. To remove a carrier, first open the front bezel then push the release button located beside the drive LEDs. Swing the handle fully out and then use it to pull it straight out as shown in Figure 6-4.

Note: Your operating system must have RAID support to enable the hot-swap capability of the SAS/SATA drives.

SAS/SATA Drive Installation

The SAS/SATA drives are mounted in drive carriers to simplify their installation and removal from the chassis. These carriers also help promote proper airflow for the drives. For this reason, even empty carriers without SAS/SATA drives installed must remain in the chassis.

Mounting a SAS/SATA Drive in a Drive Carrier

1. Install a drive into the carrier with the printed circuit board side facing down so that the mounting holes align with those in the carrier.
2. Secure the drive to the carrier with six screws, as shown in Figure 6-5.

The SAS/SATA drive carriers are located in the front of the chassis, making them easily accessible for installation and removal. These drives are hot-swappable, meaning that they can be installed and removed while the system is running.

Installing/removing SAS/SATA drives

1. To remove a SAS/SATA drive, first push the release button located beside the drive's LEDs
2. Swing the handle fully out and use it to pull the SAS/SATA drive carrier straight out (see Figure 6-4).

Figure 6-4. Removing a Drive Carrier

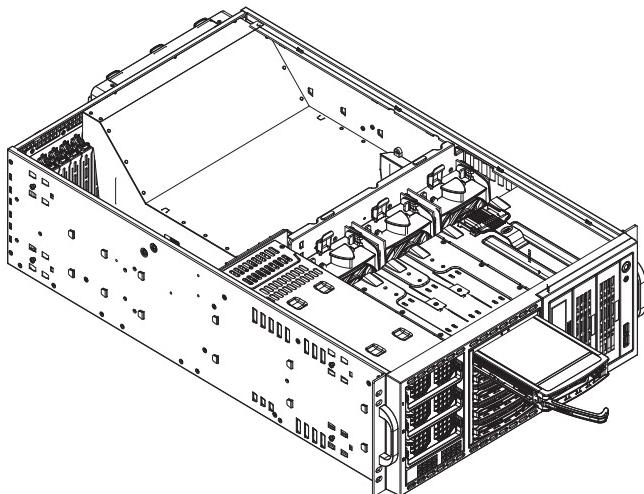
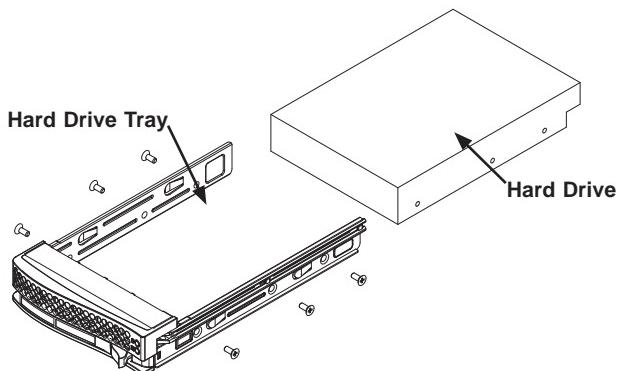


Figure 6-5. Mounting a Drive in a Carrier



Use caution when working around the SAS/SATA backplane. Do not touch the backplane with any metal objects and make sure no ribbon cables touch the backplane or obstruct the holes, which aid in proper airflow.



Important: Regardless of how many SAS/SATA hard drives are installed, all drive carriers must remain in the drive bays to maintain proper airflow.



Warning! Enterprise level hard disk drives are recommended for use in Supermicro chassis and servers. For information on recommended HDDs, visit the Supermicro Web site at <http://www.supermicro.com/products/nfo/files/storage/SAS-CompList.pdf>

Installing Components in the 5.25" Drive Bays

Drive Bay Configuration

The 4042G-6RF/TRF has three 5.25" drive bays. Components such as an extra floppy drive, IDE hard drives or DVD/CD-ROM drives can be installed into these 5.25" drive bays. See Figure 6-6 below for details.

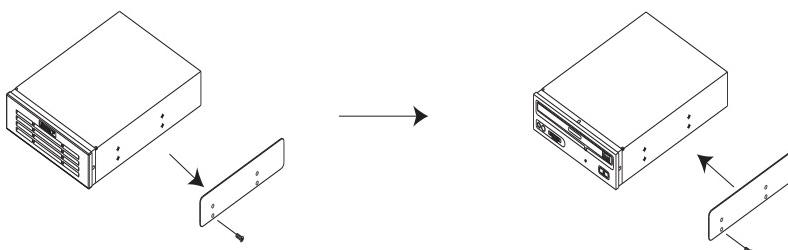
Mounting Components in the Drive Bays

1. First power down the system and then remove the top/left chassis cover to access the drive components.
2. With the cover off, remove the two or four screws that secure the drive carrier to the chassis (one side only), then push the entire empty drive carrier out from the back.

Adding a DVD/CD-ROM Drive

1. First remove the guide plates (one on each side) from the empty drive carrier and screw them into both sides of the DVD/CD-ROM drive using the holes provided.
2. Then slide the DVD/CD-ROM into the bay and secure it to the chassis with the drive carrier screws you first removed.
3. Attach the power and data cables to the drive.
4. Replace the top/left chassis cover before restoring power to the system.

Figure 6-6. Adding a Component Without a Drive Carrier



6-5 Power Supply

The A+ SERVER 4042G-6RF/TRF has a redundant 1400 watt power supply consisting of two modules. Each power supply module has an auto-switching capability, which enables it to automatically sense and operate at a 100V - 240V input voltage.

Power Supply Failure

If either of the two power supply modules fail, the other module will take the full load and allow the system to continue operation without interruption. The PWR Fail LED will illuminate and remain on until the failed module has been replaced. Replacement modules can be ordered directly from Supermicro (see contact information in the Preface). The hot-swap capability of the power supply modules allows you to replace the failed module without powering down the system.

Removing/Replacing the Power Supply

You do not need to shut down the system to replace a power supply module. The redundant feature will keep the system up and running while you replace the failed hot-swap module. Replace with the same model - (see Appendix C for the part number).

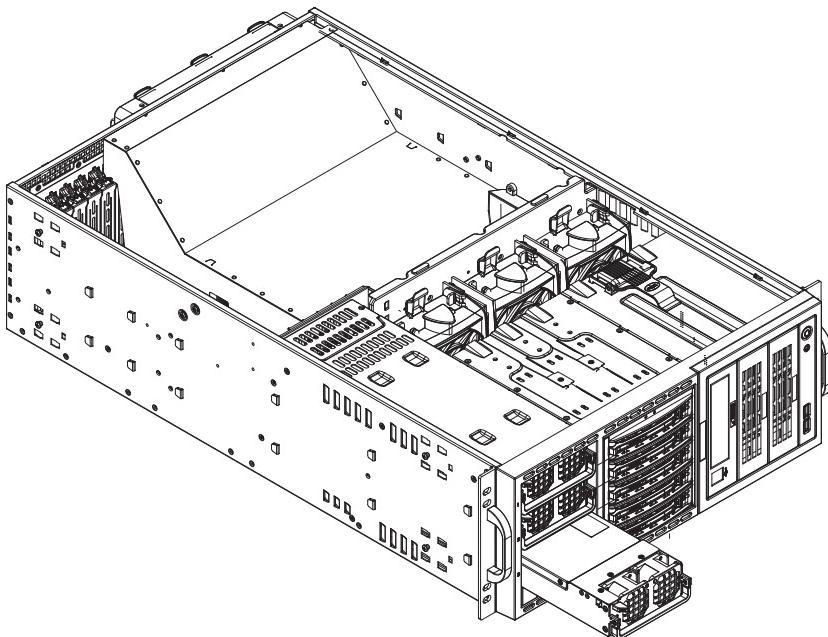
Removing the Power Supply

1. First unplug the power cord from the failed power supply module.
2. Then depress the locking tab on the power supply module and pull it straight out by the handle. See Figure 6-8 for details.

Installing a New Power Supply

1. Replace the failed module with another power supply module (must be the exact same – refer to Appendix C for the part number) as described above.
2. Push the new power supply module into the power bay until you hear a click.
3. Finish by plugging the AC power cord back into the module.

Figure 6-7. Removing a Power Supply Module



Chapter 7

BIOS

7-1 Introduction

This chapter describes the AMIBIOS™ Setup utility for the H8QG6/i-F serverboard. The AMI ROM BIOS is stored in a flash chip and can be easily upgraded using a floppy disk-based program.

Note: Due to periodic changes to the BIOS, some settings may have been added or deleted and might not yet be recorded in this manual. Please refer to the Manual Download area of our web site for any changes to BIOS that may not be reflected in this manual.

Starting the Setup Utility

To enter the BIOS Setup Utility, hit the <Delete> key while the system is booting-up. (In most cases, the <Delete> key is used to invoke the BIOS setup screen. There are a few cases when other keys are used, such as <F1>, <F2>, etc.) Each main BIOS menu option is described in this manual.

The Main BIOS screen has two main frames. The left frame displays all the options that can be configured. “Grayed-out” options cannot be configured. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it. (Note that BIOS has default text messages built in. We retain the option to include, omit, or change any of these text messages.) Settings printed in **Bold** are the default values.

A "►" indicates a submenu. Highlighting such an item and pressing the <Enter> key will open the list of settings within that submenu.

The BIOS setup utility uses a key-based navigation system called hot keys. Most of these hot keys (<F1>, <F10>, <Enter>, <ESC>, <Arrow> keys, etc.) can be used at any time during the setup navigation process.

7-2 Main Menu

When you first enter AMI BIOS Setup Utility, you will see the Main Menu screen. You can always return to the Main Menu by selecting the **Main** tab on the top of the screen with the arrow keys.

The Main Menu screen provides you with a system overview, which includes the version, built date and ID of the AMIBIOS, the type, speed and number of the processors in the system and the amount of memory installed in the system.

System Time/System Date

You can edit this field to change the system time and date. Highlight *System Time* or *System Date* using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in DAY/MM/DD/YYYY format. The time is entered in HH:MM:SS format. Please note that time is in a 24-hour format. For example, 5:30 A.M. appears as 05:30:00 and 5:30 P.M. as 17:30:00.

7-3 Advanced Settings Menu

► Boot Features

Quick Boot

If Enabled, this option will skip certain tests during POST to reduce the time needed for the system to boot up. The options are **Enabled** and **Disabled**.

Quiet Boot

If Disabled, normal POST messages will be displayed on boot-up. If **Enabled**, this display the OEM logo instead of POST messages.

Add On ROM Display Mode

This option sets the display mode for Option ROM. The options are **Force BIOS** or **Keep Current**.

Bootup Num Lock

This option selects the power-on state for the NUM lock to either **On** or **Off**.

Wait for F1 if Error

This setting controls the system response when an error is detected during the boot sequence. When enabled, BIOS will stop the boot sequence when an error

is detected, at which point you will need to press the F1 button to re-enter the BIOS setup menu. The options are **Enabled** and **Disabled**.

Hit 'DEL' Message Display

Use this option to **Enable** or **Disable** the "Press DEL to run setup" message in POST.

Interrupt 19 Capture

Select Enabled to allow ROMs to trap Interrupt 19. The options are **Enabled** and **Disabled**.

Restore on AC Power Loss

This sets the action that occurs when an AC power loss occurs. Options include Power Off, Power On and **Last State**.

Watch Dog Timer

This sets the Watch Dog Timer. Options include **Enabled** or **Disabled**.

► **Processor & Clock Options**

CPU Configuration

This displays static information on the Module Version, AGESA Version, Physical Count and Logical Count for the system's processor(s) and clock.

CPU Information

This setting is used to select which physical CPU's information to display. Options include **Processor 0** or Processor 1. The information for the selected processor includes Processor number, Revision, Cache L1/L2/L3, Speed, NB CLK, Able to Change Frequency and uCode Patch Level.

Note: Zero is always the "Boot Strap Processor" or main CPU with all others being "Application Processors".

GART Error Reporting

This option should remain disabled for normal operation. The driver developer may enable this option for testing purposes. Options are **Enabled** or **Disabled**.

Microcode Update

This setting **Enables** or **Disables** microcode updating.

Power Now

This setting is used to **Enable** or **Disable** the AMD Power Now feature.

ACPI SRAT Table

This option **Enables** or Disables the building of the ACPI SRAT Table.

CPU DownCore Mode

This option sets the CPU DownCore Mode for your system. If you change this option then a cold reset is required. Options include **Auto Mode**, Maximum Core Level, No Leveling, 2 Cores, 4 Cores, 6 Cores, 8 Cores, 10 Cores and 12 Cores.

C1E Support

This option enables or **disables** C1E Support for your system.

► Advanced Chipset Control

Chipset Information

Chipset Information is displayed at the top of this menu on the chipset CIMx version used.

► NorthBridge Chipset Configuration

► Memory Configuration

Bank Interleaving

This option allows you to enable Bank Interleaving in the system. Options include **Auto** and **Disabled**.

Node Interleaving

This option allows you to enable Node Interleaving in the system. Options include **Auto** and **Disabled**.

Channel Interleaving

This option allows you to enable Channel Interleaving in the system. The options are **Auto** and **Disabled**.

CS Sparing Enable

This option will reserve a spare memory rank in each node when enabled. Options are **Enable** and **Disable**.

Bank Swizzle Mode

This sets the Bank Swizzle Mode to either **Enabled** or **Disabled**.

► ECC Configuration

ECC Mode

This submenu sets the level of ECC protection. Options include Disabled, **Basic**, Good, Super, Max and User. Selecting User activates the other option for user setting.

Note: The "Super" ECC mode dynamically sets the DRAM scrub rate so all of memory is scrubbed in 8-hours.

DRAM ECC Enable

This setting allows hardware to report and correct memory errors automatically, maintaining system integrity. Options are **Enabled** or **Disabled**.

► DRAM Timing Configuration

DRAM Timing Config

This setting specifies the DRAM timing configuration. Options are **Auto** and **Manual**.

Memory Timing Parameters

This selects the which node's timing parameters to display. The only selection for this option is **CPU Node 0**.

Clock Speed Information

Clock speed information for memory is also displayed under this Northbridge Chipset Configuration page.

IOMMU

This setting is used to disable or set the GART size in systems without AGP. Options include **Enabled** and **Disabled**.

OHCI/EHCI HC Device Functions

These settings allow you to either **Enable** or **Disable** functions for OHCI or EHCI bus devices.

USB 2.0 Controller Mode

Use this setting to configure the USB 2.0 Controller in either **Hi-Speed** (480 Mps) or Full Speed (12 Mps) mode.

Legacy USB Support

Select "Enabled" to enable the support for USB Legacy. Disable Legacy support if there are no USB devices installed in the system. "Auto" disabled Legacy support if no USB devices are connected. The options are Disabled, **Enabled** and Auto.

► IDE/SATA Configuration

On Chip SATA Channel

This setting allows you to **Enable** or Disable the OnChip SATA channel.

On Chip SATA Type

Use this setting to set the On Chip SATA type. Options include **Native IDE**, RAID, AHCI and Legacy IDE.

SATA IDE Combined Mode

This setting allows you to **Enable** or Disable the SATA IDE combined mode.

PATA Channel Configuration

This allows you to set PATA channel configuration. Options include **SATA as Primary** or **SATA as secondary**.

► Primary/Secondary/Third IDE Master/Slave

LBA/Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a disk drive. The options are **Disabled** and **Auto**.

Block (Multi-Sector Transfer)

Block mode boosts IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if block mode is not used. Block mode allows transfers of up to 64 KB per interrupt. Select "Disabled" to allow the data to be transferred from and to the device one sector at a time. Select "Auto" to allows the data transfer from and to the device occur multiple sectors at a time if the device supports it. The options are **Auto** and **Disabled**.

PIO Mode

PIO (Programmable I/O) mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases. The options are **Auto**, 0, 1, 2, 3, and 4. Select Auto to allow BIOS to auto detect the PIO mode.

Use this value if the IDE disk drive support cannot be determined. Select 0 to allow BIOS to use PIO mode 0, which has a data transfer rate of 3.3 MBs. Select 1 to allow BIOS to use PIO mode 1, which has a data transfer rate of 5.2 MBs. Select 2 to allow BIOS to use PIO mode 2, which has a data transfer rate of 8.3 MBs. Select 3 to allow BIOS to use PIO mode 3, which has a data transfer rate of 11.1 MBs. Select 4 to allow BIOS to use PIO mode 4, which has a data transfer rate of 16.6 MBs. This setting generally works with all hard disk drives manufactured after 1999. For other disk drives, such as IDE CD-ROM drives, check the specifications of the drive.

DMA Mode

Selects the DMA Mode. Options are **Auto**, SWDMA0, SWDMA1, SWDMA2, MWDMA0, MWDMA1, MWDMA2, UDMA0, UDMA1, UDMA2, UDMA3, UDMA4 and UDMA5. (SWDMA=Single Word DMA, MWDMA=Multi Word DMA, UDMA=UltraDMA.)

S.M.A.R.T.

Self-Monitoring Analysis and Reporting Technology (SMART) can help predict impending drive failures. Select "Auto" to allow BIOS to auto detect hard disk drive support. Select "Disabled" to prevent AMI BIOS from using the S.M.A.R.T. Select "Enabled" to allow AMI BIOS to use the S.M.A.R.T. to support hard drive disk. The options are Disabled, Enabled, and **Auto**.

32-Bit Data Transfer

Select "Enabled" to activate the function of 32-Bit data transfer. Select "Disabled" to deactivate the function. The options are **Enabled** and **Disabled**.

Hard Disk Write Protect

Use this setting to Enable or **Disable** hard disk write protection for your system. This is effective only if the device is accessed through the BIOS.

IDE Detect Timeout (Sec)

Use the +/- keys to adjust and select the time out for detecting ATA/ATAPI devices. The default value is **35**.

► PCI/PNP Configuration

Clear NVRAM

Select Yes to clear NVRAM during boot-up. The options are **Yes** and **No**.

Plug & Play O/S

Select Yes to allow the OS to configure Plug & Play devices. (This is not required for system boot if your system has an OS that supports Plug & Play.) Select **No** to allow AMIBIOS to configure all devices in the system.

PCI Latency Timer

This option sets the latency of all PCI devices on the PCI bus. Select a value to set the PCI latency in PCI clock cycles. Options are 32, **64**, 96, 128, 160, 192, 224 and 248.

PCI IDE Busmaster

Use this setting to **Enable** or Disable BIOS enabled uses of PCI Busmastering for reading or writing to IDE drives.

Slot 1 ~ Slot 4 PCI-E OPROM

These four settings (Slot 1 through Slot 4) allow you to **enable** or disable the numbered slot's Op ROM, except for the VGA card.

UIO PCI-E OPROM

This setting allows you to **enable** or disable the UIO slot Op ROM, except for the VGA card.

Onboard NIC Option ROM Select

This setting allows you to disable or select the onboard NIC option ROM. Options include **Disabled**, PXE and iSCSI.

► SuperI/O Configuration

Serial 1 Address

This option specifies the base I/O port address and Interrupt Request address of serial port 1. Select "Disabled" to prevent the serial port from accessing any system resources. When this option is set to *Disabled*, the serial port physically becomes unavailable. Select "3F8/IRQ4" to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. Options include **Disabled**, **3F8/IRQ4**, 3E8/IRQ4 and 2E8/IRQ3

Serial 2 Address

This option specifies the base I/O port address and Interrupt Request address of serial port 2. Select "Disabled" to prevent the serial port from accessing any system resources. When this option is set to "Disabled", the serial port physically becomes unavailable. Select "2F8/IRQ3" to allow the serial port to use 2F8 as its I/O port address and IRQ 3 for the interrupt address. Options include Disabled, **2F8/IRQ3**, 3E8/IRQ4 and 2F8/IRQ3.

► Remote Access Configuration

Remote Access

Use this option to **Enable** or Disable Remote Access in your system. If enabled, the settings below will appear.

Serial Port Number

Use this setting to select the serial port for console redirection. Options include COM1, COM2 or **COM3**. The displayed base address and IRQ for the serial port changes to reflect the selection you make.

Note: Make sure the selected port is enabled.

Serial Port Mode

Selects the serial port settings to use. Options are **(115200 8, n, 1)**, (57600 8, n, 1), (38400 8, n, 1), (19200 8, n, 1) and (09600 8, n, 1).

Flow Control

Selects the flow control to be used for console redirection. Options are **None**, Hardware and Software.

Redirection After BIOS POST

Options are Disable (no redirection after BIOS POST), Boot Loader (redirection during POST and during boot loader) and **Always** (redirection always active). Note that some OS's may not work with this set to Always.

Terminal Type

Selects the type of the target terminal. Options are **ANSI**, VT100 and VT-UTF8.

VT-UTF8 Combo Key Support

Allows you to **Enable** or Disable VT-UTF8 combination key support for ANSI/VT100 terminals.

Sredir Memory Display Delay

Use this setting to set the delay in seconds to display memory information. Options are **No Delay**, 1 sec, 2 secs and 4 secs.

► Hardware Health Configuration

CPU Overheat Temperature

This setting allows you to specify the type of alarm for CPU overheating. Options include **The Early Alarm** and **The Default Alarm**.

Other items in the submenu are systems monitor displays for the following information:

CPU1 Temperature, CPU2 Temperature, CPU3 Temperature, CPU4 Temperature, System Temperature, Fan 1-9 Reading, Chipset FAN1-2, CPU1 VCore, CPU2 VCore, CPU3 VCore, CPU4 VCore, 3.3V Vcc (V), + 5Vin, +12V Vcc (V), CPU1~4 DIMM Voltage, Chipset SR56x0 Voltage, 3.3V standby, Battery Voltage

► System Fan Monitor

This submenu contains lists the system fans and contains RPM information for them.

Fan Speed Control Modes

This submenu allows you to determine how the system will control the speed of the onboard fans. The options are Full Speed/FS (Max Cooling), Performance/PF (Better Cooling), **Balanced/BL** (Balance between performance and energy saving), Energy Saving/ES (Lower Power and Noise).

A display also showing the speeds of FAN1 Speed ~ FAN11 Speed is shown on this page.

► ACPI Configuration

ACPI Aware O/S

Use this setting to enable or disable ACPI support for the operating system if it supports ACPI. Options include **Yes** (enable ACPI support) or No (disable ACPI support).

ACPI Version Features

Use this setting to determine which ACPI version to use. Options are ACPI v1.0, **ACPI v2.0** and ACPI v3.0.

ACPI APIC Support

Determines whether to include the ACPI APIC table pointer in the RSDT pointer list. The available options are **Enabled** and **Disabled**.

Headless Mode

Use this setting to enable or **disable** headless operation mode through ACPI.

WHEA Support

Use this setting to **enable** or disable Windows Hardware Error Architecture.

► IPMI Configuration

This menu shows static information about the IPMI firmware revision and status of the BMC, as well as options for IPMI configuration.

► View BMC System Event Log

Pressing the Enter key will open the following settings. Use the "+" and "-" keys to navigate through the system event log.

Clear BMC System Event Log

Selecting this and pressing the Enter key will clear the BMC system event log.

► Set LAN Configuration

Use the "+" and "-" keys to choose the desired channel number. This displays Channel Number and Channel Number Status information.

► IP Address

This submenu sets the IP address source as either Static or **DHCP**. Selecting Static allows you to manually set the IP Address, Subnet Mask and Gateway Address.

In the field provided here enter the IP address in the decimal form of xxx.xxx.x. In the field provided here enter the IP address in the decimal form of xxx.xxx.x. The IP address and current IP address in the BMC are shown.

► MAC Address

In the field provided here enter the MAC address in the hex form of xx.xx.xx.xx.xx.xx with xx in hex form only. The current MAC address in the BMC is shown.

► Subnet Mask

In the field provided here enter the Subnet address in the decimal form of xxx.xxx.xxx.xxx with xxx having a value of less than 256 and in decimal form only. The current subnet address in the BMC is shown.

► Gateway Address

In the field provided here enter the Gateway address in the decimal form of xxx.xxx.xxx.xxx with xxx having a value of less than 256 and in decimal form only. The current Gateway address in the BMC is shown.

► Event Log Configuration

View Event Log

Pressing the Enter key will open the event log. Use the "↑" and "↓" keys to navigate through the system event log.

Mark All Events as Read

Selecting this and pressing the Enter key marks all events as read in the event log.

Clear Event Log

Selecting this and pressing the Enter key clears the system event log.

SR56x0 (RD890S) PCIE Error Log

This setting allows you set an error log of PCIE errors. Options include **Yes** or **No**.

7-4 Security Settings Menu

AMI BIOS provides a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

Change Supervisor Password

Select this option and press <Enter> to access the sub menu, and then type in the password.

Change User Password

Select this option and press <Enter> to access the sub menu, and then type in the password.

Boot Sector Virus Protection

This option is near the bottom of the Security Setup screen. Select "Disabled" to deactivate the Boot Sector Virus Protection. Select "Enabled" to enable boot sector protection. When "Enabled", AMI BIOS displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard disk drive. The options are Enabled and **Disabled**.

7-5 Boot Settings Menu

► Boot Device Priority

This feature allows you to prioritize the boot sequence from the list of available devices. A device that is in parenthesis has been disabled in the corresponding type menu.

► Removable Drives

This feature allows you to specify the boot sequence from the list of available removable drives. A device that is in parenthesis has been disabled in the corresponding type menu.

► Hard Disk Drives

This feature allows you to specify the boot sequence from the list of available hard disk drives. A device that is in parenthesis has been disabled in the corresponding type menu.

► CD/DVD Drives

This feature allows you to specify the boot sequence from the list of available CD/DVD drives. A device that is in parenthesis has been disabled in the corresponding type menu.

► USB Drives

This feature allows you to specify the boot sequence from the list of available USB drives. A device that is in parenthesis has been disabled in the corresponding type menu.

► Network Drives

This feature allows you to specify the boot sequence from the list of available network drives. A device that is in parenthesis has been disabled in the corresponding type menu.

Retry Boot Device

This setting allows you to enable or **disable** auto retry of all boot devices.

7-6 Exit Menu

Select the Exit tab from AMI BIOS Setup Utility screen to enter the Exit BIOS Setup screen.

Save Changes and Exit

When you have completed the system configuration changes, select this option to leave BIOS Setup and reboot the computer, so the new system configuration parameters can take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

Discard Changes and Exit

Select this option to quit BIOS Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Exit from the Exit menu and press <Enter>.

Discard Changes

Select this option and press <Enter> to discard all the changes and return to AMI BIOS Utility Program.

Load Optimal Defaults

To set this feature, select Load Optimal Defaults from the Exit menu and press <Enter>. Then Select "OK" to allow BIOS to automatically load the Optimal Defaults as the BIOS Settings. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications.

Load Fail-Safe Defaults

To set this feature, select Load Fail-Safe Defaults from the Exit menu and press <Enter>. The Fail-Safe settings are designed for maximum system stability, but not maximum performance.

Appendix A

BIOS Error Beep Codes

During the POST (Power-On Self-Test) routines, which are performed each time the system is powered on, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue the boot-up process. The error messages normally appear on the screen.

Fatal errors are those which will not allow the system to continue the boot-up procedure. If a fatal error occurs, you should consult with your system manufacturer for possible repairs.

These fatal errors are usually communicated through a series of audible beeps. The numbers on the fatal error list (on the following page) correspond to the number of beeps for the corresponding error. All errors listed, with the exception of Beep Code 8, are fatal errors.

A-1 AMIBIOS Error Beep Codes

Beep Code	Error Message	Description
1 beep	Refresh	Circuits have been reset (Ready to power up)
5 short, 1 long	Memory error	No memory detected in system
1 long, 8 short	Video error	Video adapter disabled or missing

Notes

Appendix B

Installing Windows

After all hardware components have been installed, you must first configure RAID Settings before you install the Windows OS and other software drivers. To configure RAID settings, please refer to RAID Configuration User Guides posted on our web site at www.supermicro.com/support/manuals.

Note: The following OS installation instructions are written for the Windows XP/2003 OS only. If you have the Windows 2008 or Windows Vista OS, please follow the instructions displayed on your screen to install the OS.

B-1 Installing Windows to a RAID System

1. Insert Microsoft's Windows XP/Windows 2003 Setup CD in the CD-ROM drive and the system will start booting up from CD.
2. Press the <F6> key when the message "Press F6 if you need to install a third party SCSI or RAID driver" displays.
3. When the Windows XP/Windows 2003 Setup screen appears, press "S" to specify additional device(s).
4. Insert the driver diskette you created in Section 5-11, *Building a Driver Diskette*, into Drive A: and press the <Enter> key.
5. Highlight "Manufacturer Supplied Hardware Support Disk" and hit the <Enter> key.
6. Highlight the first "Adaptec RAID" driver shown and press the <Enter> key to install it. Soon a similar blue screen will appear again.
7. Again hit the <S> key, then highlight the second item, "nForce Storage Controller" and press the <Enter> key, then <Enter> again to continue with the Windows setup.
8. Press the <Enter> key to continue the installation process. (If you need to specify any additional devices to be installed, do it at this time.) Once all devices are specified, press the <Enter> key to continue with the installation.

9. From the Windows XP/Windows 2003 Setup screen, press the <Enter> key. The XP/2003 Setup will automatically load all device files and then, continue the Windows XP/Windows 2003 installation.

10. After the Windows XP/Windows 2003 OS Installation has completed, the system will automatically reboot.

B-2 Installing Windows to a Non-RAID System

1. Insert Microsoft's Windows OS Setup CD in the CD-ROM drive and the system will start booting up from the CD.

2. Continue with the installation. The Windows OS Setup screen will display.

3. From the Windows OS Setup screen, press the <Enter> key. The OS Setup will automatically load all device files and then continue with the Windows installation.

4. After the installation has completed, the system will automatically reboot.

5. Insert the Supermicro Setup CD that came with your system into the CD-ROM drive during system boot and the main screen will display.

Appendix C

System Specifications

Processors

Quad AMD Opteron 6100 series (Socket G34 type) processors

Note: please refer to our website for details on supported processors.

Chipset

One AMD SR5690 chipset, one AMD SR5670 chipset and one SP5100 Southbridge chipset

BIOS

16 Mb AMIBIOS SPI Flash ROM

Memory Capacity

Thirty-Two (32) single/dual/tri/quad channel DIMM slots supporting up to 512 GB of DDR3-1333/1066/800 registered ECC or 128GB of DDR3 Unbuffered ECC/non-ECC SDRAM

Note: interleaved memory requires DIMMs to be installed in pairs - refer to Section 5-6 for details.

SATA Controller

AMD SR5690 on-chip controller to support six 3 Gb/s Serial ATA (RAID 0 and 1 supported)

SAS Controller

Onboard LSI-2008 SAS2 controller for eight SAS drives (RAID 0, 1 and 10 supported). RAID 5 is supported with the use of an optional RAIDKey for RAID 5 SAS support (only on H8QG6/i-F serverboard)

Drive Bays

Five (5) hot-swap drive bays to house five (5) standard SAS/SATA drives

Expansion Slots

Supports the use of six PCI expansion slots: one PCI-Express x8 slot, one PCI-Express x4 slot, three 64-bit 133 MHz PCI-X slots and one 64-bit 100 MHz PCI-X slot. (The 100 MHz PCI-X slot supports Zero Channel RAID.)

Serverboard

H8QG6/i-F (proprietary ATX form factor)
Dimensions: 16.48" x 13" (418 x 330 mm)

Chassis

SC748TS-R1400BP (1U rackmount)
Dimensions (both): (WxHxD) 17.2 x 7 x 25.5 in. (437 x 178 x 648 mm)

Weight

Gross (Bare Bone): 65.5 lbs. (29.8 kg.)

System Cooling

(fan speed controlled by BIOS setting, Chp 7)
Three (3) 9-cm chassis fans
Three (3) 8-cm exhaust fans

System Input Requirements

AC Input Voltage: 180-240 VAC
Rated Input Current: 7.2A (180V) to 9.5 (240V)
Rated Input Frequency: 50-60 Hz

Power Supply

Rated Output Power: 1400 W w/PFC (Part# PWS-1K41F-1R)
Rated Output Voltages: +12V (116A), +5Vsb (4A)

Operating Environment

Operating Temperature: 10° to 35° C (50° to 95° F)
Non-Operating Temperature: -40° to 70° C (-40° to 158° F)
Operating Relative Humidity: 8% to 90% (non-condensing)
Non-Operating Relative Humidity: 5 to 95% (non-condensing)

Regulatory Compliance

Electromagnetic Emissions: FCC Class B, EN 55022 Class A, EN 61000-3-2/-3-3, CISPR 22 Class A

Electromagnetic Immunity: EN 55024/CISPR 24, (EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11)

Safety: CSA/EN/IEC/UL 60950-1 Compliant, UL or CSA Listed (USA and Canada), CE Marking (Europe)

California Best Management Practices Regulations for Perchlorate Materials:
This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. "Perchlorate Material-special handling may apply.
See www.dtsc.ca.gov/hazardouswaste/perchlorate"

Notes

(continued from front)

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